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**THE FRANK E. BUNTS  
INSTITUTE**

announces

**A Course In**

**Diseases of the  
Endocrine Glands**

on

**MONDAY, TUESDAY, and WEDNESDAY  
APRIL 18, 19, and 20, 1938**



**A description of the course and an outline of the  
subjects to be covered will be found on pages 75-77.**

## THE CLINICAL SIGNIFICANCE OF HEMATURIA

### *With Illustrative Case Reports*

C. C. HIGGINS, M.D.

Hematuria, or the presence of blood in the urine, should not be considered as a clinical entity for which treatment is instituted, but rather as a symptom which requires immediate investigation to ascertain the underlying, responsible, etiologic factors.

As a general rule, the presence of blood in the urine alarms the patient sufficiently that he seeks medical advice and relief. However, it is unfortunate that, in many instances, the hematuria is intermittent in character and, when the bleeding subsides, a false sense of security is established. The patient presumes that he is well and, as his general health may not seem to be impaired, he appears justified in such deductions. But to the physician, the cessation of bleeding is no indication that its significance can be minimized or its importance lessened and a delay in complete urological investigation should not be countenanced.

Herman<sup>1</sup> of Philadelphia, in a study of 150 cases of diseases of the kidney, noticed the presence of hematuria in 43.3 per cent of this group. It is estimated that in 54 per cent of renal tumors in adults, the initial symptom is hematuria.

In a recent survey of cases of tumor of the bladder collected by the Carcinoma Registry of the American Urological Association<sup>2</sup>, hematuria was the cardinal symptom in 826 of the 902 cases in the Registry, and it was the initial symptom in 573 or 69.37 per cent of the 826 patients who complained of bleeding.

In a series of 798 consecutive cases of hematuria reviewed at the Cleveland Clinic a few years ago<sup>3</sup>, the bleeding was due to a new growth in the genito-urinary tract in 32 per cent; in 11 per cent it was associated with renal tuberculosis; and in 16 per cent, calculi were the responsible factors.

Kretschmer<sup>4</sup> reviewed 860 cases of hematuria and noted that in 235 or 76.5 per cent of 307 cases in which the hematuria was associated with a lesion in the bladder, the etiological factor was either a papilloma or a carcinoma. Of 307 cases of lesions of the bladder associated with this symptom, tumor was the inciting cause of hemorrhage in 235 cases (76.5 per cent); stone ranked second and tuberculosis third. In 96 per cent of the 860 cases, the hematuria was associated with lesions within the genito-urinary tract. In nine cases, the blood in the urine was due to general disease, while in 12 cases the cause of bleeding was not determined.



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In 1,500 admissions to the urological service at the Brooklyn Hospital, Rathbun<sup>5</sup> found hematuria to be the outstanding symptom in 203 or 13.5 per cent of the cases. He stated that in many instances this was the only symptom mentioned by the patient, while in a second group the only complaint was of red blood cells in the urine. In 106 of 203 cases, or more than 50 per cent, a neoplasm was found in the genito-urinary tract. Dr. Rathbun stated, "If we could impress upon every man practicing medicine the fact that in 50 per cent of all cases, hematuria is produced by a tumor and that a large majority of these cases are malignant or potentially malignant, we would do more to reduce our cancer mortality and morbidity than can possibly be done in any other way."

Eight malignant tumors of the kidney occurred in Rathbun's series and in 7, or 87 per cent, bleeding was the prominent symptom. There were 81 cases of carcinoma of the bladder and, in this group, bleeding occurred in 61, or 75 per cent. Sixty-one patients with carcinoma of the prostate were included in the report. Here again, bleeding was prominent in 7 or 11.4 per cent. Bleeding occurred in 22 or 66.6 per cent of 33 patients with papilloma of the bladder. In a series of 274 cases of hypertrophy of the prostate, bleeding occurred in 17 or 6.1 per cent.

MacKenzie<sup>6</sup> in 1932 studied 2,240 cases of gross hematuria, the patients having been admitted to the Department of Urology at the Royal Victoria Hospital from 1928 to 1932. He found the following sources of bleeding: kidney, 41.38 per cent; ureter, 12.23 per cent; bladder, 20.80 per cent; prostate, 17.90 per cent; urethra, 5.53 per cent; and unclassified, 2.14 per cent. He concluded: "In plain terms, of the 2,240 cases treated, approximately 75 per cent were due to these grave conditions. Surely this cannot fail to impress us with the fact that red blood cells have no place in the normal urine, and that they are caused by some pathological condition which it is our duty to discover."

The significance of the detection, on microscopic examination, of blood in the urine likewise must not be passed over lightly, and careful examinations to determine the cause should be employed in this group of cases. If, during the course of examination, the presence of red blood cells is detected in the urine and if symptoms referable to the genito-urinary tract are present, complete urological investigation is advisable. If, however, there are no symptoms referable to the genito-urinary tract, microscopic examination may be repeated at short intervals of time. Again, if red cells are constantly present or if they are found intermittently, complete investigation of the genito-urinary tract is essential. In women, a specimen of urine secured by catheterization obviously should be studied.

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Patients with hematuria may be divided into three distinct groups:

1. *Hematuria Associated with Systemic Diseases and General Conditions.*

- A. Blood dyscrasias:
  - 1. Hemophilia
  - 2. Polycythemia vera
  - 3. Purpura hemorrhagica
  - 4. Leukemia
- B. Following acute infections:
  - 1. Scarlet fever
  - 2. Tonsillitis
  - 3. Measles
  - 4. Small pox
- C. Deficiency and dietary disease:
  - 1. Scurvy
  - 2. High protein diet
- D. Following medication
  - 1. Urotropin
  - 2. Cantharides
  - 3. Turpentine
  - 4. Sodium salicylate
  - 5. Mandelic acid
- E. Miscellaneous
  - 1. Hodgkin's disease
  - 2. Hypertension with nephritis

II. *Hematuria Associated with Extra-Urinary Pathology:*

- A. Diverticulitis of colon
- B. Carcinoma of rectum
- C. Appendicitis
- D. Inflammatory disease of the pelvis

III. *Intrinsic Lesions Within the Genito-Urinary Tract:*

- A. Kidney
  - 1. Infection
  - 2. Tumor
  - 3. Polycystic kidney
  - 4. Tuberculosis
  - 5. Calculi
  - 6. Nephritis
- B. Ureter
  - 1. Tumor
  - 2. Stone
  - 3. Stricture
- C. Bladder
  - 1. Tumor
  - 2. Inflammation
  - 3. Calculi
  - 4. Foreign bodies
  - 5. Ulcer

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- D. Bladder neck
  - 1. Prostate, including seminal vesicles
- E. Urethra
  - 1. Infection
  - 2. Stricture
  - 3. Foreign body
  - 4. Tumor
  - 5. Following instrumentation
  - 6. Ulcer

While this classification does not include every lesion or condition which may be conducive to the presence of blood in the urine, it serves to indicate the intensive investigation which is necessary if a correct diagnosis is to be established.

In some instances, the history elicited from the patient is of value in determining the proper approach to the problem, although, as will be observed from some of the cases reported, it may be misleading. Similarly, the presence of two coexisting pathological conditions must not be overlooked.

If, following endoscopy, cystoscopy, and the employment of pyelograms, a responsible lesion is not found, complete medical examination and intensive employment of laboratory procedures are necessary. This is well emphasized by the findings of Locke and Minot<sup>7</sup> who observed hematuria in 15 per cent of 110 cases of chronic myelogenous leukemia. These writers also stated that 20 per cent of their patients with hemophilia complained of hematuria and added that this symptom might be the only local manifestation of underlying disease.

Squier and Newburgh<sup>8</sup> found red cells in the urine after the patient had followed a diet high in proteins, thus emphasizing the rôle diet may play in the production of hematuria.

The relationship between deficiency of vitamin C (scurvy) and hematuria, as Stepp<sup>9</sup> and Engelkes<sup>10</sup> have emphasized in their reports, has stimulated further study in this field, and other writers have reported similar cases.

Thus, determination of the cause of hematuria requires an accurate history and complete physical examination supplemented by such essential laboratory procedures as tests of urinary function, urinalysis, complete study of the blood including bleeding and clotting time, and other procedures as deemed advisable.

Complete study of the urinary tract is essential, and this should include endoscopic and cystoscopic examinations, examination of specimens of urine from the kidneys, tests of function, and pyelography. If these procedures are employed, I believe that, in the vast majority of cases, an accurate diagnosis can be established and therapy instituted early in the course of the disease.

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The following brief case histories illustrate conditions which may be associated with hematuria and emphasize the futility of attempting to establish a diagnosis from the standpoint of the history elicited from the patient.

### CASE REPORTS

*Case 1:* A man, 51 years of age, entered the Clinic on April 8, 1937, complaining of recurrent red spots on the skin, bleeding from the tongue and rectum, and blood in the urine. Prior to admission, he had always been in good health. In the preceding year, small red spots had appeared on his trunk and extremities on several occasions. During the last few attacks, blood had been noted in the urine and occasionally the urine was quite red. Bleeding from the rectum had also occurred.

General examination gave essentially normal findings except for small petechial hemorrhages on the extremities and mucous membranes of the mouth. The spleen was not enlarged and there was no adenopathy. The tourniquet test brought out petechiae.

Blood studies: The red blood cells numbered 3,580,000. There were moderate anisocytosis and poikilocytosis and pallor. Examination gave the following findings: reticulocytes, 1.8 per cent; volume of packed red blood cells, 73 per cent of normal (33 cc. per 100 cc.); volume index, 1.01; hemoglobin, 65 per cent of normal (110 gm. per 100 cc. with Haden Hauser hemoglobinometer); color index, 0.90; saturation index, 0.89; white blood cells, 3,300 per c.mm.; differential count: neutrophils, 51 per cent; lymphocytes, 43 per cent; monocytes, 6 per cent; icterus index, 5; platelets, 50,000 per c.mm.; bleeding time 5 minutes; clot retraction—none; nothing abnormal in concentrated preparation of the white blood cells.

*Comment:* In this case, the hematuria was definitely associated with the blood dyscrasia.

*Final diagnosis:* Essential thrombopenia (purpura).

*Case 2:* The patient was a man, 57 years of age, who entered the Clinic on February 3, 1937, complaining of blood in the urine. The first attack of hematuria occurred in 1914, lasted two to three months, and then subsided spontaneously. The next attack occurred in 1928 and lasted 3 to 4 months, during which time the kidney pelvis were washed out with a solution of silver nitrate. In 1935, blood was again noticed in the urine and this time it was present for about 3 months. At the time of our examination, blood had been present in the urine for 6 months, but was not associated with other urinary symptoms. The diet had always been inadequate in fruit and vegetables.

General examination revealed no abnormalities. Examination of the blood showed it to be normal. The urine contained numerous red blood cells.

Cystoscopic examination revealed no abnormalities. Numerous red blood cells were found in a specimen of urine from the kidneys. The tests of renal function showed normal elimination.

A diagnosis of scurvy was made.

In addition to increasing the amount of fruit in the diet, two tablets of cevitamic acid, 10 mg. were prescribed after meals, and a course of moccasin venom in initial doses of 0.4 cc. was also given. This treatment was followed by striking results.

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*Comment:* In this case, aside from red blood cells in the specimens of urine from the kidneys, the urological examination gave normal findings. Complete studies of the blood failed to show any blood dyscrasia. A final diagnosis of scurvy was made, and the symptoms disappeared following dietary adjustment, cevitamic acid, and moccasin venom therapy.

*Final diagnosis:* Scurvy.

*Case 3:* A man, 32 years of age, was seen in consultation on April 8, 1937. His complaint was of blood in the urine. For six weeks he had been in the hospital where treatment had been given for pus in the urine, enormous doses of urotropin having been administered over a period of three weeks. During the ten days preceding our examination, hematuria had been quite profuse and the patient complained of extreme irritability of the bladder.

Cystoscopic examination revealed a pronounced chemical cystitis. Pyelograms showed normal findings as did cultures of the urine.

*Comment:* In this case an acute chemical cystitis had been induced by the large doses of urotropin. The bleeding subsided by forcing fluids and the administration of sodium bicarbonate. Urological examination 2 months later revealed no abnormal findings.

*Final diagnosis:* Chemical cystitis.

*Case 4:* A man, 40 years of age, entered the Clinic on October 26, 1937, complaining of hematuria and aching type of pain in the region of the left kidney. Three years previously, the patient had passed three stones and hematuria had been noted at that time. Seven weeks preceding our examination, blood again appeared in the urine and the aching type of pain in his back had been present for a few days. No other urinary symptoms were noticed and a roentgenogram taken previously showed no evidence of renal calculi.

A pyelogram taken in the Clinic showed a nonopaque stone in the pelvis of the kidney.

*Comment:* In this case, the bleeding preceded pain in the back and a roentgenogram did not show the stone in the pelvis which was not demonstrable until the pyelogram was made.

*Final diagnosis:* Nonopaque stone in the pelvis of the left kidney.

*Case 5:* A woman, 29 years of age, entered the hospital on February 17, 1930. Her complaint was of blood in the urine. This had first been observed two years previously, but had not been accompanied by any other urinary disturbances at that time. The bleeding continued for one month and then subsided. One year later, blood was again noted in the urine, and it persisted for 2 months. Bleeding had been present for 3 weeks preceding our examination but was the only complaint.

Urological investigation established the diagnosis of tuberculosis of the left kidney and a nephrectomy was performed.

*Comment:* In this instance, although the history of intermittent hematuria dated back over a period of two years, there were no other urinary symptoms. Following nephrectomy, the patient has remained free from symptoms.

*Final diagnosis:* Tuberculosis of the left kidney.

*Case 6:* A woman, 57 years of age, entered the Clinic on April 30, 1934, complaining of blood in the urine and high blood pressure. The blood in the urine had first been noticed two years previously, and had lasted for only one day. One year later, blood was again present in the urine but no other urinary

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symptoms occurred. Medicine was prescribed at this time and in two weeks the bleeding subsided. One week preceding our examination, blood again was present in the urine, casts were found in the urine, and a diagnosis of nephritis was made. At this time the patient entered the Clinic for examination.

Cystoscopic examination revealed a large, papillomatous growth in the region of the left ureteral orifice. This was fulgurated and radium implanted at the base of the tumor. A pathological diagnosis of papilloma of the bladder was made. A recurrence developed one year later and fulguration was again employed, since which time cystoscopic study has revealed no evidence of a recurrence.

*Comment:* In this case, bleeding had occurred 2 years previous to examination and, due to the associated high blood pressure and casts in the urine, a diagnosis of nephritis had been made. When, however, cystoscopic examination was employed, the correct diagnosis of a papilloma of the bladder in addition to hypertension and nephritis was established.

*Final diagnosis:* Hypertension, nephritis, papilloma of the bladder.

*Case 7:* A girl, 20 years of age, entered the Clinic on February 2, 1937, complaining of blood in the urine. Aside from appendicitis 2 years previously, for which an appendectomy had been performed, the patient had been in good health. Albuminuria had been noted for 10 years. For 6 months, she had been aware of the presence of blood in the urine, believing it to be due to kidney disease. She had nocturia once, and occasional frequency. Only a slight amount of blood appeared in the urine and at times she was free from it for weeks.

Cystoscopic examination revealed a large tumor on the left lateral wall of the bladder. Resection of the bladder was performed February 18, 1937.

*Pathological diagnosis:* Lymphosarcoma of the bladder.

*Comment:* In view of the presence for years of albumin in the urine and only a slight amount of blood in the urine, a diagnosis of nephritis had been made previously. Cystoscopic examination, however, revealed the presence of a tumor of the bladder.

*Final diagnosis:* Lymphosarcoma of the bladder.

*Case 8:* A man, 62 years of age, entered the Clinic on March 6, 1935, complaining of frequency of urination, slight difficulty in voiding, and blood in the urine. Two years previously, some difficulty in voiding and hematuria had been noted. Since that time, there had been nocturia two or three times, but occasionally the urine was clear. Two days before examination, complete retention developed.

Examination of the rectum revealed enlargement of the prostate, grade II. The prostate was firm and in one area it was quite hard.

A radical prostatectomy and seminal vesiculectomy were performed.

A pathological diagnosis of carcinoma of the prostate was made.

*Comment:* In this case, the bleeding was associated with a malignant lesion in the prostate. Bleeding, however, was one of the first symptoms. In spite of the radical operation, the patient now has a recurrence.

*Final diagnosis:* Carcinoma of the prostate.

*Case 9:* A woman, 56 years of age, entered the Clinic on April 26, 1937, complaining of blood in the urine. She stated that from time to time during



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the preceding 2 years she had noticed traces of blood in the urine. There was no irritability of the bladder or other urinary symptoms.

Cystoscopic examination revealed a tumor on the left lateral wall of the bladder. Resection of the left wall of the bladder was performed on April 28, 1937, and a pathological diagnosis of carcinoma was made.

*Comment:* In this instance, only traces of blood appeared in the urine and for varying intervals of time gross hematuria did not occur. There were no other urinary symptoms.

The patient is living and well with no evidence of recurrence one and one-half years later.

*Final diagnosis:* Carcinoma of the bladder.

*Case 10:* A woman, 59 years of age, entered the Clinic complaining of blood in the urine and frequency of urination. Two weeks previously, pain on urination developed and she noticed the presence of blood in the urine. Bleeding was much less pronounced during the following week; however, the burning on urination and frequency persisted.

Urological examination revealed the presence of hemorrhagic cystitis.

*Comment:* In this case, the age of the patient would suggest that a malignant lesion might be responsible for the hematuria. However, complete urological examination revealed inflammation of the bladder to be the etiologic factor and this responded rapidly to treatment.

*Final diagnosis:* Hemorrhagic cystitis.

*Case 11:* A man, 44 years of age, entered the Clinic on November 20, 1935, complaining of blood in the urine.

About two weeks previously, following a severe cold and acute tonsillitis of several days' duration, he observed the presence of blood in the urine. There was no accompanying frequency or dysuria.

Complete urological study revealed the presence of a subacute glomerular nephritis (mild).

*Comment:* In this case, the history of the hematuria following a severe acute tonsillitis immediately suggested the possibility of nephritis. However, complete urological investigation was instituted to rule out the possibility of additional coexisting pathology.

*Final diagnosis:* Subacute glomerular nephritis (mild).

*Case 12:* A woman, 62 years of age, entered the Clinic on May 21, 1936, complaining of "rupture" and two attacks of blood in the urine.

The first attack of hematuria had occurred four years previously and the second one year later. The bleeding lasted about six weeks during which time blood was present in the urine daily. It then became intermittent and gradually stopped. No other urinary symptoms were elicited. The patient had had a rupture for 35 years which caused some pain on coughing and considerable distress.

Complete urological examination revealed a tumor of the left kidney. Nephrectomy was performed.

*Comment:* In this case, following the first attack of hematuria, the patient was well and free from symptoms for one year and after the second attack for 2 years. Her chief discomfort was due to the hernia which she wished

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to have repaired. This case emphasizes the necessity for urological investigation in patients giving a history of hematuria.

*Final diagnosis:* Hypernephroma of left kidney. Hernia.

## CONCLUSIONS

1. Hematuria is a symptom which requires early diagnosis. It should not be treated as a clinical entity.
2. Systemic disease, as well as lesions intrinsic in the genito-urinary tract, may account for the presence of blood in the urine.
3. In a series of 798 consecutive cases of hematuria reviewed from the records of the Cleveland Clinic, 59 per cent of the patients were suffering from new growths in the genito-urinary tract, renal tuberculosis, or calculous disease.
4. Complete medical and urological study may be required to establish an accurate diagnosis.
5. Hematuria with or without accompanying pain is frequently of grave significance and early determination of the responsible factors is required to render a good prognosis.

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## CARCINOMA OF THE STOMACH

E. N. COLLINS, M.D.

Carcinoma of the stomach is commonly considered a hopeless condition. The rate of operability, not more than 25 per cent, has not increased during the past decade. The incidence of this lesion is rising, it attacks the stomach more frequently than any other organ in the body, except the uterus, and it has been estimated that 38,000 persons in the United States alone die annually from carcinoma of the stomach. The situation of the lesion may be such that it is well advanced before tangible symptoms occur and its removal then may be impossible.

On the other hand, in 60 per cent of our cases, the lesion was situated in the pyloric third of the stomach. When the lesion occurs in this area, it usually causes characteristic symptoms early in the course of the disease. Early diagnosis and resection are possible.

Since the roentgen examination is established as the most important procedure in the detection of an early lesion, we believe the chief means of making advancement in treatment, that is, to increase the rate of operability, is to demand a reliable roentgen examination in the presence of less clinical evidence than has been the custom in the past.

Most of our patients with gastric carcinoma had had symptoms 6 to 12 months before a reliable roentgen examination was made. Since most of these patients had lesions in the resectable area of the stomach, the pyloric third, roentgen examinations, made earlier in the course of the disease, should have resulted in the discovery of a larger number of operable lesions.

One of our most difficult tasks is to make known the fact that the patient has an incurable cancer of the stomach. The purpose of this discussion is to present a review of our experience with this lesion, from the standpoints of both the clinician and the roentgenologist. Since the roentgen examination is of greatest significance, details relative to the procedures we have found most helpful will be given. Physicians and laymen alike are now "cancer conscious," and we believe anyone in the carcinoma age who has gastric symptoms which persist one month or longer should have a thorough examination, including a reliable roentgen examination. In this way, more operable lesions will be discovered and at least some progress will be made as compared with no progress during the past ten years.

Advancement has been made in the early diagnosis of carcinoma elsewhere in the body, many of which, at one time, were considered hopeless. The woman with a lump in her breast or the one who has a bloody discharge does not wait as long as formerly before demanding an exact

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diagnosis. But the patient with significant dyspepsia still procrastinates too long before demanding an exact diagnosis.

If we are sufficiently "cancer-conscious," we will not wait until the obsolete text-book picture of gastric carcinoma is present before demanding a reliable roentgen examination. We must make the diagnosis, if possible, while the patient appears normal, before there is a palpable tumor or a reduction in hemoglobin and red blood cell count, or loss in weight.

There are physicians who, when confronted with characteristic evidence of gastric carcinoma, deliberately avoid roentgen examination. They sincerely believe that nothing can be done by way of curing the patient, so why subject him to the trouble and expense of a roentgen examination? From our experience, we firmly believe that at least one roentgen examination is indicated under such circumstances. If gastric carcinoma is found to involve an unresectable area of the stomach, the condition is truly lamentable. But, since our experience shows that more than one-half of these lesions are in a resectable area, too much emphasis cannot be placed on the value of a trustworthy roentgen examination as early in the course of the disease as the first appearance of the patient in the physician's office. These patients, sooner or later, realize that they are not making satisfactory progress, so they seek aid elsewhere and we see too many of these tragic cases, tragic because the primary lesion is most often in the pyloric third of the stomach, and could have been resected if diagnosis had been made at the time the patient first consulted the physician.

Although the number of cures in relation to the incidence of the disease is appallingly small, approximately 50 per cent of the patients are alive and with no evidence of recurrence three years after operation if the growth is limited to the walls of the stomach at the time of the resection<sup>1</sup>. Gatewood<sup>2</sup>, in reviewing a series of cases in which operation had been performed at the Presbyterian Hospital in Chicago, found that, of those patients who survived operation, 46.1 per cent lived more than three years, and 39.5 per cent survived more than five years, regardless of the extent of involvement of lymph nodes at the time of resection. When dealing with gastric carcinoma involving the distal third of the stomach, we know that, if a curative resection cannot be done, at least palliative types of operations are justifiable, because these patients may live in comparative comfort for years.

The size of the growth in the pyloric segment does not necessarily determine the extent of metastases or operability. If physical examination does not reveal evidence of fixation and there is no demonstrable evidence of metastases, such as in the cul-de-sac of Douglas as determined by rectal examination, or in the cervical glands, we believe

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exploratory operation is justified, regardless of the size of the lesion. Large lesions may metastasize late while early lesions may metastasize early. A polypoid type of lesion, although palpable on physical examination, may be limited to the pyloric segment of the stomach. An infiltrative type of lesion too often involves more of the stomach than is detectable by roentgen examination, and, although physical examination reveals entirely normal findings, the patient may have an unresectable cancer of the stomach.

*Age Incidence:* In our series, 80 per cent of the patients were between the ages of 40 and 70 years, the usual carcinoma age, but nearly 10 per cent were below the age of 40. Patients who have not attained the usual carcinoma age are not immune to gastric carcinoma any more than they are immune to carcinoma elsewhere in the body.

*Sex:* Approximately 70 per cent of the patients were males, 30 per cent were females.

*Heredity:* Eighteen per cent gave a history of carcinoma in the family.

*Duration of Symptoms:* A review of the histories of 600 cases reveals that symptoms had been present for the following lengths of time: 1 to 3 months—19 per cent; 3 to 6 months—15 per cent; 6 to 12 months—24 per cent; 12 to 18 months—12 per cent. Thus the largest group had had symptoms 6 to 12 months before a diagnosis was made.

There was a history highly suggestive of previous benign ulcer in approximately 5 per cent of the patients.

### SYMPTOMS

Since there are no characteristic symptoms which apply to all cases of early gastric carcinoma, we believe that any adult person who has persistent, chronic indigestion (so-called "stomach trouble") should be considered as having carcinoma until the roentgen examination shows no evidence of this disease. This applies particularly to an individual who has had perfect digestion until a few months prior to seeking medical attention. The onset of indigestion in many of our patients started during a severe "cold," bronchitis, or an attack of influenza. Alterations in diet or the use of patent medicines may have given relief of symptoms for weeks at a time, but sooner or later the patient realizes that, regardless of self-treatment, his indigestion persists.

The type of symptoms will, of course, depend upon the location and character of the lesion. At least four syndromes should be kept in mind. A lesion near the cardia often produces dysphagia while a lesion at or near the pylorus produces early symptoms of obstruction. On the other hand, a lesion in the pars media, the so-called "silent area" of the stomach, may produce no symptoms other than unusual weakness

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and anemia until far advanced. In the relatively small group of cases wherein there is a history highly suggestive of previous peptic ulcer, with remittent attacks over years of time, there is usually a significant change in symptoms which suggests either complications or malignant change.

The most characteristic group of symptoms occurs in the case of a lesion situated at or near the pylorus, and this is the condition with which we are particularly concerned because symptoms occur early and complete resection is often possible in the early stages. The first symptom is usually an unexplainable loss of appetite. Then distress in the epigastrium occurs, usually coming on 15 to 30 minutes after eating. The distress may be described as a sense of fullness, weight, or oppression, and later becomes a dull pain. Belching is prominent. Finally, food causes not only distress but nausea and vomiting also. The patient slowly becomes weaker, thinner, and paler. A lump may be discovered in the upper abdomen, and this may mean that a hopeless stage has been reached. If possible, the diagnosis should be made before physical examination reveals any evidence of abnormality.

Although these symptoms are characteristic of carcinoma at the pylorus of the stomach, it is obvious that similar symptoms occur in the presence of any obstructing lesion in this area. However, the clinician must always think first of the possibility of carcinoma when these symptoms are present, particularly if there has been no antecedent indigestion and the symptoms have been present continuously for a relatively short period of time. Some patients with a malignant lesion in this area will have symptoms highly suggestive of peptic ulcer and will obtain temporary relief by taking frequent feedings and alkalis, while other patients will have indeterminate symptoms.

Bleeding, as determined by benzidine tests for occult blood in the stools, is a common finding, but massive hemorrhage in patients having gastric carcinoma is unusual in our experience. Perforation is also uncommon in our experience.

Cachexia is a late sign and usually signifies the hopeless stage.

### PHYSICAL EXAMINATION

Emphasis has been placed upon the fact that the chance for cure applies chiefly to those patients who have no abnormal findings on physical examination. Occasionally, there will be evidence of metastasis in the liver, omentum, cul-de-sac, or cervical lymph nodes before the primary growth can be palpated. If a palpable mass in the upper abdomen is present, it may be tender. It usually is not fixed. Not only does it move with respiration but it can be moved on change of posture by the patient, particularly on deep inspiration. The mass may be felt

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when the patient is sitting, standing, or leaning forward, if not while he is lying on his back. Evidence of pyloric obstruction may be present.

Laboratory examinations, such as gastric analyses and blood counts, frequently show abnormalities even though the patient may have a resectable lesion. Gastric analyses usually show a diminution in acidity, and blood counts reveal a hypochromic anemia, but normal findings may be present, and occasionally hyperacidity is found. The most severe degree of anemia is encountered when dealing with lesions in the pars media of the stomach, because, due to the absence of symptoms, these lesions are usually far advanced before the physician is consulted.

### PATHOLOGY

The clinician and roentgenologist are chiefly interested in the gross characteristics of the lesion, such as size, situation, whether or not it is causing obstruction, its operability, the resulting size and shape of the stomach as a whole, and other clinical features encountered in each individual problem.

Although pathologists have devised many classifications of carcinoma of the stomach, certain gross features predominate as emphasized by Kantor<sup>3</sup>. Mixed types of lesions are commonly encountered, but the chief characteristic gross involvement may be a polypoid lesion, an infiltrative lesion, or an ulcerating carcinoma.

In the *polypoid group*, a polypoid mass or masses project into the lumen of the stomach. This includes adenocarcinoma, the medullary and colloid forms of carcinoma, as well as papillary carcinoma which arises in a pedunculated polyp, and other tumors such as adenomata which have undergone malignant change.

In the *infiltrative group*, the gross findings consist chiefly of a thickening of the gastric wall. Scirrhus carcinoma is sometimes associated with linitis plastica which was formerly regarded as benign. Due to the excessive growth of connective tissue, detailed study of the microscopical sections is necessary to establish an accurate diagnosis. Scirrhus carcinoma is usually a slowly growing tumor which involves all coats of the stomach, particularly the submucosa and the muscularis. On the other hand, diffuse medullary carcinoma and lymphosarcoma<sup>4</sup>, from the gross standpoint of malignant tumors, are included in this group, and these lesions are highly malignant.

*Ulcerations* develop in any of the previously mentioned forms of carcinoma, but from the gross anatomical standpoint the ulceration may seem to be the predominant change. In our experience, carcinoma does not develop in benign ulcers in more than 5 per cent of the cases.

The size and shape of the stomach are altered according to the type and extent of the growth, as well as its location. Carcinoma at the

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# CANCER of the STOMACH

## PATHOLOGY



## ROENTGENOLOGY

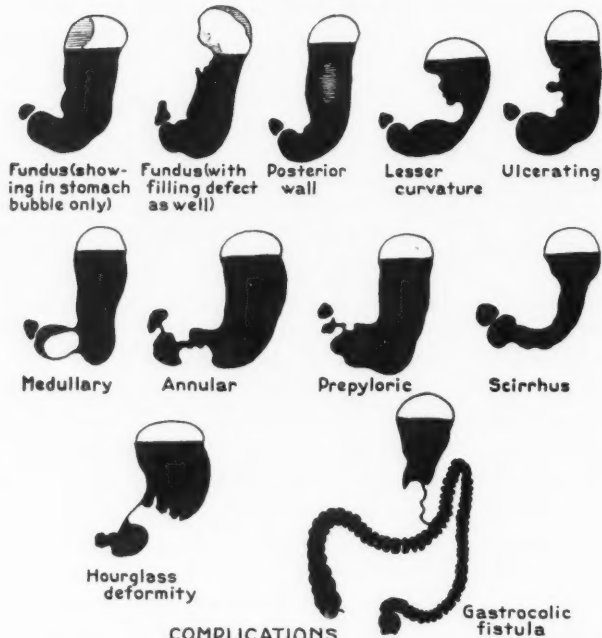


FIGURE 1: Types of pathological changes and roentgen findings in carcinoma of the stomach. (By kind permission of Kantor, J. L.: Synopsis of Digestive Diseases, St. Louis, C. V. Mosby Co., p. 116, 1937.)

cardiac end may contract the stomach, an hour-glass deformity may be due to cancer in the pars media, and dilatation of the stomach may be caused by a growth at the pylorus.

Metastases occur in the regional lymph nodes and the liver. During the original examination, palpation of all superficial lymph nodes is a routine procedure. Involvement of the left supraclavicular gland (Virchow's gland) is more rare in our experience than the occasional metastases in the cul-de-sac (Blumer's shelf). Peritoneal metastases, including bilateral metastases to the ovaries (Krukenberg's tumors),



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may produce symptoms and findings which are more predominant than those attributable to the primary lesion in the stomach. In our experience, metastasis to bone is rare, occurring in not more than 6 per cent of cases. It should be emphasized that not all enlarged lymph nodes encountered at exploration are due to metastases.

### ROENTGEN EXAMINATION

When the gross pathological findings are kept in mind, the interpretation of the roentgen findings, particularly in the case of an early lesion, are facilitated (Fig. 1). In order to make the roentgen examination available to the largest possible number of patients, the cost of this examination should be as low as adequate procedures will permit. One or two films are sufficient for purposes of record if the findings at fluoroscopic examination show the presence of a large lesion. When fluoroscopy is not used or if the findings are questionable, the examination should not be considered adequate unless serial films are taken with the patient in several different positions. *A reliable opinion cannot be based on the inspection of one or two films alone unless the lesion is large.*

Early lesions on the anterior or posterior wall, at or near the stoma of a gastro-enterostomy, or in the cardiac end of the stomach are most easily visualized when only a small amount of barium suspension is used. In fact, such lesions may be obscure if the stomach is examined only when completely distended with the opaque medium. On the other hand, evidence of an early infiltrative process in the wall of the stomach may be apparent only when this viscus is completely filled with the barium suspension. At this time, lack of flexibility of a certain segment, particularly if the peristaltic waves skip this area, is revealed to best advantage.

### METHODS USED IN THE ROENTGEN EXAMINATION

A summary of the methods which have proved most important in our experience<sup>5</sup> are as follows: By considering the fluoroscopic examination as divided into two stages, one during and after the ingestion of a small amount of barium suspension, and the other during and after the ingestion of the remainder of the barium meal, equal importance is attached to both phases of the examination. During the first stage, emphasis rests on a minute study of the mucosal markings, while during the second stage, emphasis is placed on evidence of induration, lack of flexibility, peristalsis, and motility of the stomach. Films are made in various positions while only a few mouthfuls of barium are in the stomach if the initial fluoroscopic findings are abnormal; otherwise, the second part of the fluoroscopic examination continues with the first.

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In using palpatory manipulation, it is important to make certain that the marginal contours of the gastric antrum, pylorus, and duodenal bulb, each in turn, are visualized by making pressure proximal thereto, before making any pressure directly on these areas. Otherwise, spasm may be induced and it may be necessary to send the patient out of the fluoroscopic room for some time, from five to thirty minutes sometimes being necessary before the examination can be continued, or a recheck examination the following day may be required.

Examination in all positions should never be omitted because a globular viscus is being examined. In order to detect the presence of an early lesion, we must remember that it may not involve either the lesser or the greater curvature of the stomach; it may be situated on the anterior or posterior wall and may be visualized with difficulty.

The following routine procedure is used: While the patient is standing, he turns slowly from the extreme left (left side of the body to table) to the extreme right position. When examining a high steer-horn stomach in an obese individual, the patient turns entirely around. In addition to observing any deformity of the gas bubble while the patient is standing, in order to make certain that no abnormality exists in the cardiac end of the stomach, the patient is placed in the supine and Trendelenburg positions and rotated into both the left and right oblique positions. To exclude the presence of diaphragmatic hernia, the patient is instructed to take a deep breath (Trendelenburg position), hold it, and bear down as though at stool. The increase in intra-abdominal tension while the patient is in these positions will materially aid in disclosing any evidence of abnormality in the cardiac end of the stomach. Then the usual fluoroscopic examination in the supine and prone positions with the table in the horizontal position, the patient turning from side to side, is made. *Unless recent hemorrhage or questionable perforation is present, palpatory manipulation is used in order to visualize all parts of the stomach.* Films are made at the most advantageous time and with the patient in the most advantageous positions to show the lesion. If the findings are easily demonstrated, only one or two films are made. If the fluoroscopic findings are negative, three films are made routinely, because occasionally an early lesion is missed on fluoroscopic examination. These films are made while the patient is in the supine position, to exclude a possible lesion in the cardiac end of the stomach, the prone position, to exclude a possible lesion involving the body and antrum of the stomach, and the right oblique position, to exclude a possible lesion in the anterior or posterior wall of the stomach, as well as to remove possible spinal compression on the gastric antrum. In the case of an early lesion which is situated below the costal border, a compression device may be used while taking some of the films, usually during the first



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stage of the examination when the patient has only a small amount of barium suspension in the stomach. An additional check on the examination of the mucosal markings, which is advisable if spasm is a confusing factor, is obtained by making films as the stomach empties, at intervals of one-half hour. In cases showing abnormal initial fluoroscopic findings, we routinely make retention films four to six hours after the ingestion of the barium meal.

### INTERPRETATION OF ROENTGEN FINDINGS

The interpretation of the roentgen findings is obvious when the lesion is large. In this discussion we are primarily interested in the early lesion. Correct interpretation of the presence of a polypoid type of growth is a simple matter compared with the detection of an early infiltrative type of lesion. In order to visualize the gross pathological changes mentioned, it is helpful to contrast the roentgen findings in the two groups. In this way, the early changes from the normal findings are more apparent (Table I).

**TABLE I**  
Roentgen Findings in Carcinoma of the Stomach

|                                 | <b>POLYPOID GROUP</b><br>(Projection into Gastric Lumen)                         | <b>INFILTRATIVE GROUP</b><br>(Thickening of Gastric Wall)   |
|---------------------------------|--|---|
| <b>Predominant Deformity</b>    | Filling defect; subtraction from general luminal contour                         | Usually no filling defect   |
|                                 | Filling defect corresponds with palpable mass on fluoroscopic examination        |   |
| <b>Mucosal markings</b>         | Rugae terminate abruptly   | Rugae terminate gradually if at all   |
| <b>General size of stomach</b>  | Usually normal. Large if obstructed  | Usually smaller than normal<br>Loss of expansibility  |
| <b>General shape of stomach</b> | Usually normal, aside from filling defect, unless pyloric obstruction is present | Usually asymmetrical, distorted by contractures; occasional X-shaped deformity  |
| <b>Flexibility</b>              | Normal except in area of filling defect  | Marked loss of flexibility  |
| <b>Pyloric Function</b>         | Normal unless obstruction is present   | Usually gaping of pylorus<br>Markedly increased motility  |
| <b>Peristalsis</b>              | Absent in involved area  | Absent in involved area   |
| <b>Gastric Retention</b>        | Present if lesion involves pylorus   | May be present if lesion is annular   |
| <b>Differential Diagnosis</b>   | Persistent pylorospasm. Benign gastric neoplasms. Hypertrophic rugae             | Persistent pylorospasm. Prepyloric ulcer. Hypertrophy pyloric muscle. Linitis plastica. Gastric syphilis. Malignant lymphomata. Gastric tuberculosis. |

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An early roentgen finding, unless the lesion involves the pylorus, is a gaping of the pylorus or rapid emptying of the stomach, regardless of the type or location of the growth in the stomach. It is well known that patients who have low gastric acidity often have stomachs which empty rapidly. Rapid emptying is a predominate feature in the case of infiltrative lesions and there is usually a dilatation of the duodenal bulb due to the rapid emptying mentioned. The stomach may be empty before the films are exposed unless they are made soon after the ingestion of the barium meal.

The dilatation of the stomach due to a *malignant* obstructing lesion is usually less pronounced than that caused by a benign obstructing lesion, possibly due to the relatively short duration of the lesion, the early gaping of the pylorus which may, in part, be due to infiltration of the gastric wall, particularly in the infiltrative type of lesion. During exploration, the pathological changes in the infiltrative type of lesion are often found to be more extensive than the roentgen examination would indicate, while in the case of the polypoid type of lesion the findings on exploration are likely to be less extensive than was contemplated.

In a consideration of the third group, the lesions which are predominantly *ulcerating carcinomata*, one must remember that gastric carcinoma is encountered more commonly than benign gastric ulcers. In our experience, benign gastric ulcer is rare. The roentgen criteria which have been found important have been discussed elsewhere<sup>6</sup>. A fixed routine has been established, namely, if operation is not performed a neoplastic process is not excluded unless progress roentgen examinations show a marked diminution or a disappearance of the gastric deformity in two to four weeks while the patient is on medical management for ulcer, irrespective of symptomatic relief or disappearance of occult blood in the stools. A history of recurring attacks of indigestion for a long period of time does not exclude a malignant process at the time the roentgen examination is made.

A roentgen diagnosis of an ulcerating neoplasm is made when any one or more of the following criteria are present: the niche has a large transverse diameter, 2.5 cm. (the size of a quarter) or larger; it has an irregular border; it is associated with a filling defect, a subtraction from the general luminal contour of the stomach although diminutive in size; or it is situated at or near the greater curvature of the stomach. The meniscus sign<sup>7</sup> and overhanging border<sup>8</sup> of the ulcer are pathognomic of a neoplastic process.

From the standpoint of location alone, we regard any ulcer in the pyloric third of the stomach with suspicion, even though it is on the lesser curvature. Gastric resection is often the treatment of choice

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in this instance, even though the ulcer is benign. Singleton<sup>9</sup> has reported 4 cases of ulcer in the prepyloric area which were proved benign by serial microscopical sections. Thus, an ulcer in this area is not necessarily a part of a neoplastic process, but in our experience such lesions are more often malignant than benign.

Other findings which are frequently associated with an ulcerating neoplasm are the following: the spastic phenomena which are often associated with a benign ulcer are not only absent but peristalsis itself is usually sluggish, adjacent rugae are usually obliterated, and the lesion is generally not tender on palpation during the fluoroscopic examination.

The gastric ulcer is usually benign if the niche is small and has a smooth, clear-cut outline without evidence of an associated filling defect, is situated on or near the lesser curvature at the incisura angularis or proximal thereto, and the adjacent rugae show no abnormality other than possible accentuation and convergence toward the crater. Localized tenderness and spastic phenomena, such as an incisura on the greater curvature opposite the ulcer, pylorospasm, or a six-hour gastric retention may or may not be associated findings. However, the roentgen diagnosis of "benign gastric ulcer" is not made unless there is a marked diminution or disappearance of the gastric deformity on progress roentgen examinations. The differential diagnosis, from the roentgen standpoint, must include the conditions mentioned in Table I.

### DIAGNOSIS

In our experience, the interpretation of the roentgen findings has coincided with the findings on exploration in 97 per cent of the cases wherein exploration was performed. Therefore, we believe the roentgen examination is the most important single diagnostic procedure in the early diagnosis of gastric carcinoma. Gastroscopy and intragastric photography are assuming increasing importance but, at the present time, we believe these procedures are adjuncts to a reliable roentgen examination.

### TREATMENT

Although the treatment of gastric carcinoma is too often hopeless, an increasing number of cures are being obtained by radical resection. The situation of the lesion may be such that it is well advanced before symptoms occur and its removal may be impossible, but if the lesion is situated in the pyloric third of the stomach, if there is no evidence of fixation of the primary growth or evidence of metastases, we believe exploration is indicated, regardless of the size of the lesion. While the infiltrative type of lesion is often more extensive than the roentgen or exploratory findings would seem to indicate, a large polypoid lesion,

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even though palpable on physical examination, may be a localized process. In any event, if the lesion is situated at or near the pylorus, exploration and gastro-enterostomy are usually indicated because palliative procedures in this instance may result in comparative comfort to the patient for long periods of time.

The only treatment of cancer of the stomach is surgery, directed toward either the removal of the growth or to palliation if the growth is not resectable.

In our experience, roentgen therapy is effective only in lymphosarcoma of the stomach. In gastric cancer, roentgen therapy has not only failed to influence the course of the disease but it has actually increased the patient's discomfort.

### SUMMARY

1. The value of the roentgen examination in the detection of early gastric carcinoma has been considered.
2. The importance of a reliable roentgen examination in an adult who has had gastric symptoms which have persisted one month or longer has been emphasized.
3. When the lesion involves the pyloric segment of the stomach, exploration is indicated regardless of the size of the lesion, if there is no fixation of the primary growth and there is no demonstrable evidence of metastasis.
4. The chief means of making advancement in the treatment of this dreaded disease, that is, to increase the rate of operability, is to demand a reliable roentgen examination on less clinical evidence than has been the custom in the past, on the part of both the clinician and the layman.

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## SYMPTOMATOLOGY OF RIGHT TEMPORAL LOBE LESIONS

LOUIS J. KARNOSH, M. D.

The right temporal lobe has a paucity of known physiological centers, and lesions in this area may grow to extensive proportions with impunity. Not until perversions of contiguous functions occur do reliable diagnostic phenomena present themselves to the clinician. Frequently no intracranial pathology is suspected until the patient is overwhelmed by the generalized symptoms of increased intracranial pressure. Tumors of the right temporal lobe are imposters, frequently simulating lesions of the frontal lobe, of the ipsilateral and the contralateral cerebellar structures and of the suprasellar region. Moreover, the few focal symptoms referred to the right temporal lobe have not been clearly elucidated as being irritative phenomena on the one hand and ablation signs on the other.

To add to the confusion, several writers have discussed the two temporal lobes indiscriminately, disregarding the fact that the left lobe is the site of internal language which generally yields a rich symptomatology whenever it is assaulted by disease. Thus, Rowe<sup>1</sup> reviews 52 cases from Frazier's clinic, stating that visual field disturbances occurred in 29 per cent, cerebellar signs in 53 per cent, mental changes in 50 per cent, and epilepsy in 36 per cent. Auditory defects were encountered in about 25 per cent and uncinate attacks were reported as being infrequent. Koutseff<sup>2</sup> submitted a similar study of 59 cases and emphasized the high frequency of hemianopsia and uncinate seizures.

The outstanding symptoms of right temporal lobe disease are centered about the functions of taste, vision, smell and hearing. There may not only be a simple blunting of these senses, but also explosive sensations referred to the opposite side of the body and various elaborations of these phenomena into psychic states, such as dreams and hallucinations.

*Visual Disturbances:* Undoubtedly, all students of the problem will admit that the most accurate localizing sign in the right temporal lobe has been described elaborately by Cushing: a quadrantic hemianopic defect in the contralateral field. This is due to an implication of Meyer's temporal detour in the geniculo-calcarine system. Should the lesion extend deeper into the brain and involve the optic system near the pulvinar and the geniculate body, a complete homonymous hemianopsia is likely to develop.

As a part of this visual aberration there may be contralateral visual hallucinations, physiologically comparable to uncinate aurae and other cortical "discharges" along various sensory systems. Koutseff

noted that 22 per cent of his cases manifested such paroxysms. Janbon and Viallefont<sup>3</sup> described hallucinations limited to a visual semi-field in a case in whom the attacks were attributed to a spasm of the sylvian artery. Stone's<sup>4</sup> patient had visual hallucinations which were homolateral with the lesion. This paradoxical state of affairs was explained on the basis of mixed hemispheric dominance, the lesion being a right-sided temporal tumor with an aphasia in the presence of right-handedness. Among other visual symptoms, Hauptmann<sup>5</sup> has emphasized a sign which he believes to be unique for right-temporal lobe disease. His patient complained of macropsia, that is, objects at times appeared much larger than they should be.

Horrax<sup>6</sup> found that complex visual hallucinations were present in a large number of temporal lobe tumors and disagrees with the old view held by Henschen that such disturbances are primarily due to occipital lobe irritations. The visual experiences may be vivid phantasies, shadows, colored beams, animals, etc. These are particularly useful in localization if the hallucinations come on suddenly and show a definite laterality, being projected toward the side opposite the lesion of the brain.

Schlesinger<sup>7</sup> is of the opinion that occasionally enlargement of the contralateral pupil may be an indication of temporal lobe tumor, but offers no neurophysiological explanation.

*Olfactory and Gustatory Phenomena:* These disturbances, which are generally referred to the hippocampal lobes, are a familiar expression of tumors lying along the temporo-sphenoidal ridge. The dramatic features of expanding lesions at this site are explosive sensations of smell and taste, which are blended with peculiar dream states. A disgusting odor permeates the phantasy which for the moment is terrifyingly real to the patient. The uncinate irritation gives rise to a panoramic mental experience which may expand to include every possible sensory component. Several of these amplified dreams are beautifully described by Kennedy<sup>8</sup> who also observed characteristic chewing reflexes, grimaces of disgust and expressions of fear as concomitant motor patterns.

*Auditory Disturbances:* Even though it is generally presumed that the right temporal lobe has something to do with the function of hearing, auditory symptoms due to tumors or other lesions in this portion of the brain are not clearly understood. Koutseff found no disturbances of hearing in his entire series. Out of six cases of temporal lobe tumor, Ganner and Stiefler<sup>9</sup> found diminution of hearing in only one patient and this was in a homolateral ear. Rowe believes that an impairment of hearing, particularly for spoken words, tinnitus and auditory hallucina-



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tions occur very frequently, but again he made no attempt to differentiate right from left temporal lobe defect. Hauptmann's patient suffered with occasional head noise in the homolateral ear. Lawson<sup>10</sup> also reported deafness in the homolateral ear in a destruction of the left lobe, but admitted that there was some deafness also in the opposite ear.

Routine auditory tests done on three patients in whom a right hemispherectomy had been performed by Gardner at the Cleveland Clinic revealed that two had "normal" hearing in both ears. The third claimed deafness in the contralateral ear, but was in such poor condition that her subjective data were not very reliable. Penfield<sup>11</sup>, who made similar studies of his surgical ablations of the right hemisphere, conceded that ordinary hearing acuity may not be badly blunted but suggested that, if more careful studies of auditory agnosia were made, such a defect may be found in the contralateral ear.

*Psychic Disturbances:* Closely allied to those mental auras arising out of uncinate irritation are psychic components described by several writers under the term "le sentiment du déjà vu." These intellectual auras consist largely of a sensation of having lived through the exact scene then being enacted, of being able to tell what is going to happen next. Keschner<sup>12</sup> regards this as being exceedingly rare, finding not a single instance of this symptom in 110 cases. Dream states have been also described which are said to have such a peculiar quality that they may be clearly expressive of right temporal lobe pathology. Objects and experiences may appear as phantoms but when these pass away they are always regarded by the patient as having been phantoms and nothing more. Apparitions appear at the bedside in the same room with startling clarity; some of these vivid visual visitations may have an infusion of olfactory and gustatory components, may take on the "déjà vu" quality and the entire subjective experience may become such a voluminous psycho-sensory episode that it can hardly be said to have any localizing value. It is this psychic complexity that prompts such psychiatrists as Hoffman<sup>13</sup> to conclude that no true psychic state is characteristic of any one portion of the brain. Kolodny<sup>14</sup> lists the psychic disturbances most often observed in tumors of this area as: loss of memory, changes of character and temperament, hypersomnia and mental confusion.

Either temporal lobe "irritation" upsets the entire mental harmony by an overflow of abnormal stimuli to other parts, or the lesion by direct pressure on adjacent structures creates these profound psychic changes so that their localizing value can be seriously questioned.

The possibility that a study of an actively expanding right temporal lobe lesion with all of its "irritative" potentialities, contrasted with

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the study of a patient in whom this lobe was not primarily involved but was ablated by surgical resection, would have some value in clarifying a few of the many controversial points, prompts this discussion.

To this end, two patients having neoplasms of the right hemisphere, both proved oligodendrogliomas, are presented for comparison. In the first patient, the growth began clearly in the right temporal lobe and expanded into the adjacent parietal and frontal lobes. In the second individual, the neoplasm originated in the parietal zones and did not implicate the temporal lobe, which however was removed because in the opinion of the neurosurgeon an almost complete hemispherectomy was indicated. It is assumed that in the first case, some of the symptoms can be ascribed to direct invasion, irritation and compression of the right temporal lobe, to extension and to involvement of the parietal and frontal lobes. In the second patient, whatever symptoms can be found which may be attributed to temporal lobe disease are due to ablation of it and adjacent structures.

*Case 1:* A man, 39 years of age, was admitted to the Clinic on August 22, 1934. He was a feature writer, having worked for various newspapers in Cincinnati, San Francisco and Cleveland. For two years he had been having minor attacks of dizziness and periods of momentary unconsciousness. For the preceding three months, the attacks had been preceded by an olfactory aura of metallic quality. Occasionally he had paroxysmal sensations of bright light to his left side, and also noted that while driving he could not see the stoplights above and to his left, if his vision was directed straight ahead. He had ringing in both ears during the attacks and some loss of hearing for low tones.

His chief complaint, however, was a tendency to exaggerate, for which he was taken to task by his editor. Lately he complained of loss of memory and because of this on several occasions could not recall where he had parked his car. Two months before, he had proposed to his landlady's immature daughter, in spite of the fact that he was not legally divorced. He denied dream states.

The discs were bilaterally choked. There was a left upper, quadrantic hemianopsia. The left pupil was dilated, and roentgen examination revealed a calcified mass in the right temporal lobe.

On August 24, 1934, the major portion of the right temporal lobe was excised, beginning exactly at the sylvian fissure and including everything but its anterior pole and the mesial surface. Recovery was uneventful and he was discharged on September 7, 1934.

Eighteen months later he returned because of frequent headaches, left hemianopsia and a bulging of his temporal decompression. He had been having increasing difficulty with his newspaper work. Feature articles were rejected because their content was silly or exaggerated. His landlady complained of his untidy bathroom habits.

Shortly after his second admission on March 22, 1936, he insisted that he had been married while in the Clinic to an 18-year-old socialite of Cleveland. He described the marriage scene with fine clarity, claiming that Doctor Crile arranged the marriage and two nurses presided as witnesses. The ceremony was always recalled as having taken place to the left side of his bed. Frequently,



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however, he volunteered the information that the marriage was a "dream," and expressed a desire to write an article for the papers about his unusual experience. The left lower face was weak in both emotional and voluntary activation. The left hand was also weak and moderately spastic. The discs were edematous and there was now an almost complete homonymous hemianopsia.

On March 23, 1936, Doctor Gardner reopened the old site of operation and found the right temporal lobe had been replaced with tumor. The major portions of the adjoining parietal and frontal lobes were now removed. Most of the motor and premotor cortex were included in the excision.

Again he recovered very well from the operation but obviously with a left hemiplegia. During his convalescence he became progressively euphoric, demonstrating a definite "witzelsucht." He continued to write articles for his paper, among which was a review of Dr. Crile's book, "The Phenomena of Life." This was so well done that it was accepted and highly praised. Intermittently he reiterated that he had been married to a young heiress at the Clinic. His mental condition was marked by dysphoria, mental sluggishness and his insight became poor. He was transferred to a psychiatric hospital where he continued to be expansive, dictatorial and untidy. He lived until March 20, 1937. Necropsy was refused.

*Case 2:* A white man, 35 years of age, a salesman, was admitted to the Clinic on May 12, 1934. About 5 years before, while driving a stake, he had a peculiar sense of circumpulsion, a sensation that the stake was revolving and that he was whirling in unison. A month later he had a sudden tapping sensation in the left knee and elbow. Occipital headaches began two years ago, at which time he also developed Jacksonian sensory auras over the entire left side of the body.

Examination revealed a long-standing papilledema. The left pupil was larger than the right. He veered to the left in walking. There was a paresis of the left leg with loss of sense of position in the left great toe. There was some astereognosis of the left hand. Roentgen examination showed a large, slightly calcified tumor in the right parietal region.

He never manifested any mental or other symptoms referable to the right temporal lobe. The defects were entirely of a somatic, sensory quality. The motor components were entirely negative.

On March 15, 1934, Doctor Gardner removed a tumor mass the size of a small orange (185 gm.) from the right parietal region. He had a normal convalescence with no paralysis and was discharged on May 29, 1934.

Jacksonian convulsions recurred on December 22, 1934. The left leg and arm became rapidly weaker. The discs were not choked, but rather pale.

On June 20, 1935, a second operation resulted in the removal of an additional 55 gm. of tumor and brain tissue from the site of the previous operation.

On March 4, 1936, a third operation was deemed necessary because of frequent convulsions, epigastric pain and headache. At this time the visual fields were markedly constricted and there was a suggestion of a lower left quadrantic hemianopsia. Mental disturbances and uncinat fits were denied. At this time so much of the right hemisphere was removed that there only remained the basal ganglia, the uncinat gyrus, the tip of the temporal lobe and the anterior two-thirds of the frontal lobe. The resected specimen weighed 605 gm. Examination of this mass revealed no tumor infiltration into either the occipital or temporal portions.

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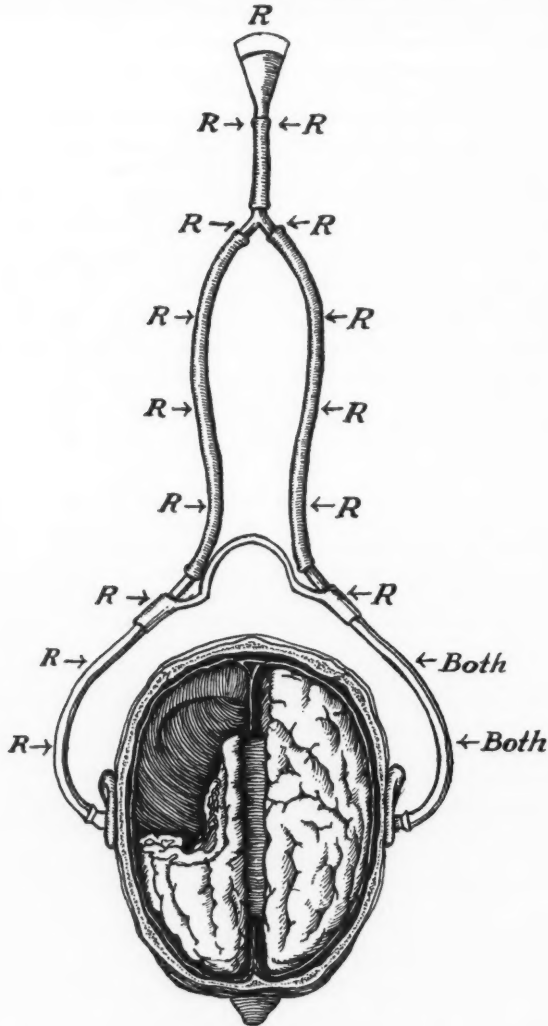


FIGURE 1: Scheme demonstrating a simple test for auditory agnosia. The stethoscope is applied, as shown, to the patient's ears and at various distances the instrument is rubbed with a tongue blade. The results are recorded in a patient in whom the right temporal, occipital and parietal lobes have been removed. There is an auditory agnosia in the left ear, for the patient did not at any time orient the source of the sound with this ear alone.

The patient continues to "carry on" to the present day, running a chicken farm.

In June, 1937, he began again with Jacksonian attacks on the left or paralyzed side. There is a sensory aura as if something were hitting him on the left

## SYMPTOMATOLOGY OF RIGHT TEMPORAL LOBE LESIONS

thumb. The head and eyes are turned to the left and over his left shoulder there is seen a steady glow like the setting of the sun during each paroxysm. Along with his hemiplegia he has a full homonymous hemianopsia. His auditory symptoms are notable. He believes his left ear is worse, for he involuntarily turns his right ear to his visitors. Tinnitus is present like a humming or squeaking but only in the right ear. Aerial conduction with the 256 tuning fork is poor in the left ear. The Weber test is referred to the right ear. Vibration over both mastoids is the same. Spatial orientation is poor in the left ear. A simple device for testing spatial auditory sense was applied. A stethoscope was placed in the ears with the bell pointed backward. (Fig. 1.) The results clearly demonstrated that the position of the source of sound, which is produced by a tongue blade rubbed on the instrument, is poorly appreciated in the left ear. The audiometer also reveals some absolute loss of auditory acuity in the left ear.

Of mental aberrations attributed to temporal lobe disease he displays none. He is generally cheerful, but not euphoric. His judgment is good in business; he insists that he is less sensitive, but perhaps more irritable. He has no wide swings in mood; denies any dream states or uncinat attacks; "déjà vu" experiences are not recalled. His only handicaps are his hemiplegia, the tinnitus and the frequent Jacksonian seizures accompanied by the visual auras in the left semi-field.

### TABLE I

SYMPTOMS FOUND IN AN IRRITATIVE, EXPANDING LESION OF THE  
RIGHT TEMPORAL LOBE CONTRASTED WITH THOSE DUE TO  
ABLATION OF THE SAME LOBE

|                                     | CASE 1<br><i>Irritative, Ex-<br/>panding lesion</i> | CASE 2<br><i>Surgical<br/>Ablation</i> |
|-------------------------------------|---|--|
| <b>VISUAL SYMPTOMS:</b>             |   |  |
| a) Contralateral Hemianopsia .....  | Present   | Present                                |
| b) Contralateral Visual Auras ..... | Present   | Present                                |
| c) Contralateral Mydriasis .....    | Present   | Present                                |
| d) Macropsia or Micropsia .....     | Absent  | Absent                                 |
| <b>OLFACTORY SYMPTOMS:</b>          |   |  |
| a) Uncinate fits .....              | Present   | Absent                                 |
| <b>AUDITORY SYMPTOMS:</b>           |   |  |
| a) Contralateral Deafness .....     | Present   | Present                                |
| b) Contralateral Agnosia .....      | Present   | Present                                |
| c) Tinnitus .....                   | Both ears   | Ipsilateral                            |
| d) Auditory Hallucinations .....    | Absent  | Absent                                 |
| <b>COMPLEX PSYCHIC SYMPTOMS:</b>    |   |  |
| a) Dream States .....               | Present   | Absent                                 |
| b) Déjà vu .....                    | ?   | Absent                                 |
| c) Euphoria .....                   | Present   | Absent                                 |

The comparison offered in the table above clearly emphasizes that psychic disturbances are almost entirely the product of a lesion which is infiltrating and expanding in nature. It is doubtful that high intracranial pressure is a prime factor, for both patients had this symptom.

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### CONCLUSIONS

An expanding or irritative lesion beginning in the right temporal lobe provides a symptomatology replete with mental disturbances, all of which arise out of excitation of the three special sensory centers, namely, smell, hearing, and sight. These may be elaborated into a broad psychic panorama, resulting in dream states, tintured with auditory, visual, and olfactory auras which are generally referred to the contralateral side.

No such mental manifestations occur if the lesion begins in the parietal lobe. Neither are any of these singular mental experiences found on ablation of the temporal lobe and its adjacent brain tissues.

What symptoms remain as true ablation phenomena or signs of destruction? Varying degrees of homonymous hemianopsia are constant features. Visual auras may occur, but they are pure, unelaborated sensations of light and color without psychic concomitants. Contralateral mydriasis, as pointed out by Schlesinger, is present, probably when destruction or ablation is quite extensive. In the auditory field, it appears that there is some absolute blunting of hearing in the contralateral ear, some tinnitus in both ears. Tests for auditory agnosia tend to support Penfield's idea that such defect always occurs in the contralateral ear if the entire right temporal lobe is removed.

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## THE RESULTS OF CELIAC GANGLIONECTOMY IN CASES OF ESSENTIAL HYPERTENSION

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The criteria on which rests the evidence of the presence of essential hypertension are reliable. These are an increase in the diastolic blood pressure, a change in the eye grounds and often in the kidneys, and the patient's own story of disability and distress. Equally evidential are the postoperative findings, among which most significant of all is the patient's own story—whether or not he is able to go back to his usual occupation; whether or not the symptoms which were present before operation have disappeared. The important fact is that a fall in blood pressure is not the only criterion upon which to base the effects of any procedure for the treatment of essential hypertension. The eye grounds, the kidney function, the state of the heart and, most important of all, the subjective effects must be considered. The presence of sclerosis is not a criterion. Sclerosis may be present in any disease; it is not uncommon in the sixth and seventh decades of life. If the hypertension was initiated in younger years, sclerosis may have become established as a result of the disease by the time the patient comes to operation. This sclerosis will not disappear even though the hypertension is completely arrested. It should be noted, as our follow-up studies have shown, that when a certain advanced degree of sclerosis has been reached, the blood pressure cannot return to the normal level, an observation which is analogous to that of the sclerosis of old age. In old age the sclerosis which develops in the arterial walls is the basis for the changes in the blood pressure which are characteristic of advancing years.

It is clear that the patient with a malignant phase of hypertension is in a plight comparable to that of the patient who has a cancer of the stomach, of the colon, of the breast, of the cervix. Long experience in the treatment of cancer has shown that patients, even with definitely incurable cancer, are willing and anxious to undergo surgical operations, and radium and x-ray treatments, in order that their discomforts and disabilities may be ameliorated. Moreover, even in operable cases, the treatment of cancer is effective in only a certain percentage of cases. The treatment of cancer of the cervix with radium, for example, seems highly satisfactory when, at the best, only 25 per cent of the patients are cured. It follows that if we can state that by the surgical treatment of hypertension the symptoms are relieved in 25 per cent of the cases and the hypertension is cured in 25 per cent, this should be considered a satisfactory treatment for hypertension. It is true that a longer time must elapse before "five year cures" can be reported for our later procedures, but for cancer, reports of one, two and three year results are given as indications of what is to be hoped for in the five year

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period. In a series of 69 consecutive cases on which follow-up data are available, symptomatic improvement was noted in 95 per cent on discharge from the hospital; in 87.8 per cent, 72.3 per cent, and 78.3 per cent respectively in 1 to 3 month, 4 to 6 month and 7 to 12 month post-operative periods. Among 15 cases of advanced malignant hypertension, the symptomatic results were favorable in 94 per cent on discharge from the hospital; in 87 per cent in a 1 to 3 month period; in 50 per cent in a 4 to 6 month period, and in 86 per cent in a period of more than one year.

### CHOICE OF OPERATIVE PROCEDURE

Our experience in the surgical treatment of essential hypertension includes 358 operations on the adrenal sympathetic system in 213 patients. Of these, 206 have been celiac ganglionectomies in 129 patients. As the result of this experience, we have selected celiac ganglionectomy with denervation of the adrenal glands as the procedure of choice, as we have found that, symptomatically and in its effects upon the blood pressure, this operation yields the most encouraging results.

As for the operative mortality, we can state that among the last 112 individual celiac ganglionectomies there have been two deaths—a mortality rate of 1.8 per cent.

### SYMPTOMATIC RELIEF

A study of our case histories has shown that in some cases there has been complete relief and in many cases marked relief from the subjective symptoms which accompany essential hypertension—relief from fatigue, headaches, heart consciousness, dizziness, mental confusion. The eyesight has improved. Many patients have been able to return to their usual occupations even though the blood pressure has not been restored to the normal level. Even though the blood pressure has been reduced only from 280/150 to 180/120 or 200/130, the subjective improvement may be marked. Moreover, these patients tend to become calmer and more equable in temperament and thus, even in cases in which the blood pressure remains well above the normal level, the violent uprushes of the blood pressure with the disastrous results which accompany emotional outbursts may be prevented. An analysis of the negative effects of celiac ganglionectomy also gives significant findings. Celiac ganglionectomy does not interfere with metabolism; it does not interfere with function of the digestive tract; it does not interfere with the function of the genito-urinary tract; there are no orthostatic effects; there are no abnormal changes in the daily blood pressure; there are no changes in the skin; there has been no instance of adrenal insufficiency; there is no change in the rate of activity of the heart; there is no change in sex function; there is no ocular interference.



## CELIAC GANGLIONECTOMY IN CASES OF ESSENTIAL HYPERTENSION

The large majority of the patients operated upon for hypertension report a one to five year duration of symptoms. The duration of symptoms ranged, however, from one month to 25 years. A study of our results has shown that the duration of symptoms had little effect upon the symptomatic results of celiac ganglionectomy and our analysis has shown that the same is true for the other types of operation.

As for individual symptoms, we shall offer a few facts derived from our study of the effects of celiac ganglionectomy. Forty-eight patients complained of headaches. All were relieved when they were discharged from the hospital, with complete relief in 14 per cent. During the first three months following the operation, 87 per cent were relieved and of these, 30 per cent had experienced complete relief. During the 7 to 12 month postoperative period, 100 per cent were relieved and 42 per cent were completely relieved.

Thirty-six patients complained of nervousness when they entered the hospital. Ninety-four per cent were improved on discharge from the hospital and 16 per cent were completely relieved. During the 1 to 3 month postoperative period, 88 per cent were improved and 12 per cent were completely relieved; during the 4 to 6 month period 77 per cent were improved and 29 per cent were completely relieved; and during the 7 to 12 month period 89 per cent were improved and 22 per cent were completely relieved.

Twenty-eight patients complained of palpitation when they entered the hospital. On discharge from the hospital all were improved and 25 per cent were completely relieved. During the 1 to 3, and 4 to 6 month postoperative periods, 90 per cent and 100 per cent respectively were improved and 25 and 29 per cent respectively were completely relieved. None of the patients reporting during the 7 to 12 month period made reference to the presence or absence of this symptom.

A similar story might be told regarding each of the other symptoms which are characteristic of essential hypertension.

TABLE I

Effects of Bilateral Celiac Ganglionectomy on the Blood Pressure

|                       | No.<br>of<br>Cases | Adm.    | End<br>of<br>Period | Dif.   |
|-----------------------|--------------------|---------|---------------------|--------|
| In Hospital.....      | 69                 | 220/130 | 169/111             | -51/19 |
| 1-3 Mos. Postop.....  | 55                 | 219/135 | 181/115             | -38/20 |
| 4-6 Mos. Postop.....  | 33                 | 236/138 | 191/118             | -45/20 |
| 7-12 Mos. Postop..... | 19                 | 221/134 | 193/119             | -28/15 |

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TABLE II

Effects of Bilateral Celiac Ganglionectomy on the Systolic Blood Pressure

| <i>Systolic Pressure Reduced</i> | <i>No. of Cases</i> | <i>20 Pts. or More</i> | <i>40 Pts. or More</i> | <i>60 Pts. or More</i> | <i>80 Pts. or More</i> | <i>100 Pts. or More</i> |
|----------------------------------|---------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
| On Discharge from Hospital.....  | 69                  | 92.8%                  | 59.4%                  | 31.9%                  | 16 %                   | 7.2%                    |
| 1-3 Mos. Postop.....             | 55                  | 78.2%                  | 56.4%                  | 20 %                   | 5.5%                   | 0                       |
| 4-6 Mos. Postop.....             | 33                  | 66.6%                  | 51.5%                  | 12.1%                  | 6 %                    | 0                       |
| 7-12 Mos. Postop....             | 19                  | 63.2%                  | 31.6%                  | 21 %                   | 5.3%                   | 0                       |

TABLE III

The Effect of Bilateral Celiac Ganglionectomy on the Diastolic Pressure

| <i>Diastolic Pressure Reduced</i> | <i>No. of Cases</i> | <i>10 Pts. or More</i> | <i>20 Pts. or More</i> | <i>30 Pts. or More</i> | <i>40 Pts. or More</i> | <i>50 Pts. or More</i> |
|-----------------------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| On Discharge from Hospital.....   | 69                  | 73.9%                  | 58 %                   | 40.6%                  | 26 %                   | 14.5%                  |
| 1-3 Mos. Postop.....              | 55                  | 71 %                   | 58 %                   | 40 %                   | 25.6%                  | 9 %                    |
| 4-6 Mos. Postop.....              | 33                  | 64.7%                  | 53 %                   | 26.5%                  | 14.7%                  | 2.9%                   |
| 7-12 Mos. Postop....              | 19                  | 68 %                   | 47.9%                  | 15.8%                  | 5.3%                   | 0                      |

TABLE IV

Reduction of Blood Pressure to Normal as Result of Bilateral Celiac Ganglionectomy

|                               | <i>On Discharge from Hospital</i> | <i>1-3 Mos. P. O.</i> | <i>4-6 Mos. P. O.</i> | <i>7-12 Mos. P. O.</i> |
|-------------------------------|-----------------------------------|-----------------------|-----------------------|------------------------|
| No. of Cases.....             | 69                                | 55                    | 33                    | 19                     |
| Completely Normal.....        | 27.5%                             | 18.2%                 | 18.2%                 | 15.8%                  |
| Blood Pressure on Admission.. | 197/119                           | 192/126               | 198/122               | 193/128                |
| Diastolic Normal.....         | 40.6%                             | 41.8%                 | 30.3%                 | 47.4%                  |
| Blood Pressure on Admission.. | 213/124                           | 206/124               | 204/125               | 215/123                |
| Systolic Normal.....          | 31.9%                             | 18.2%                 | 21.2%                 | 15.8%                  |
| Blood Pressure on Admission.. | 200/123                           | 192/126               | 197/123               | 193/128                |



# CELIAC GANGLIONECTOMY IN CASES OF ESSENTIAL HYPERTENSION

TABLE V  
Effects of Bilateral Celiac Ganglionectomy in Cases of Malignant and Non-Malignant Hypertension

|                                 | No.<br>of<br>Cases | Adm.    | Disch.  | Dif.   | 1-3<br>Mos.<br>P. O. | Dif.   | 4-6<br>Mos.<br>P. O. | Dif.   | 7-12<br>Mos.<br>P. O. | Dif.   |
|---------------------------------|--------------------|---------|---------|--------|----------------------|--------|----------------------|--------|-----------------------|--------|
| Malignant Hypertension.....     | 16                 | 234/148 | 185/119 | -49/29 | 198/129              | -37/20 | 204/123              | -25/24 | 207/131               | -24/15 |
| Non-Malignant Hypertension..... | 16                 | 221/133 | 170/107 | -51/26 | 182/113              | -37/18 | 185/118              | -31/14 | 192/123               | -29/16 |

TABLE VI  
Comparison Between the Results of Celiac Ganglionectomy in 15 Cases in Which the Blood Pressure Rose with Those in 15 Cases in Which the Blood Pressure Fell During a Period of Rest in the Hospital

|                                  | Adm.    | After<br>Period<br>of<br>Rest | Disch.  | Dif.   | 1-3<br>Mos.<br>P. O. | Dif.   | 4-6<br>Mos.<br>P. O. | Dif.   | 7-12<br>Mos.<br>P. O. | Dif.   |
|----------------------------------|---------|-------------------------------|---------|--------|----------------------|--------|----------------------|--------|-----------------------|--------|
| Rise in Blood Pr. Before Op..... | 224/129 | 226/145                       | 172/110 | -52/19 | 192/112              | -27/14 | 194/114              | -34/14 | 175/107               | -27/20 |
| Fall in Blood Pr. Before Op..... | 217/137 | 181/111                       | 172/116 | -45/21 | 183/119              | -34/18 | 188/118              | -26/24 | 184/124               | -32/22 |

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As far as symptomatic relief is concerned, celiac ganglionectomy may be considered a satisfactory method for the treatment of essential hypertension.

### EFFECTS OF CELIAC GANGLIONECTOMY ON BLOOD PRESSURE

The effects of bilateral celiac ganglionectomy on the blood pressure are given in Tables I to IV. The results were better than from any other of the procedures which had previously been employed by us. The marked fall in the systolic and diastolic pressures as shown in Tables II and III is especially significant.

Of special significance are the figures given in Table IV which show a reduction of the blood pressure to a completely normal status in 27.5 per cent of the patients on discharge from the hospital, in 18.2 per cent in the 1 to 3, and in the 4 to 6 month postoperative periods, and in 15.8 per cent in the 7 to 12 month period.

A comparison of the effects of celiac ganglionectomy on the blood pressure in cases of hypertension in the malignant and in the non-malignant phase indicates clearly that, even in cases of advanced malignant hypertension, the operation is not contraindicated (Table V, Fig. 1).

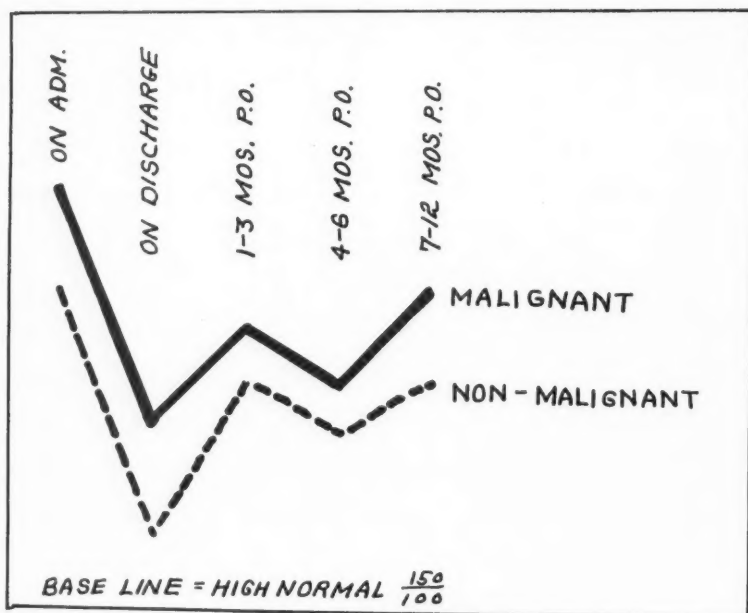


FIGURE 1: Effects of bilateral celiac ganglionectomy in cases of malignant and non-malignant hypertension.

## CELIAC GANGLIONECTOMY IN CASES OF ESSENTIAL HYPERTENSION

In order to see whether or not patients in whom the blood pressure rose during a period of rest in the hospital were worse risks than those in whom the blood pressure fell during the preoperative period, a comparison has been made between the end results in 15 consecutive

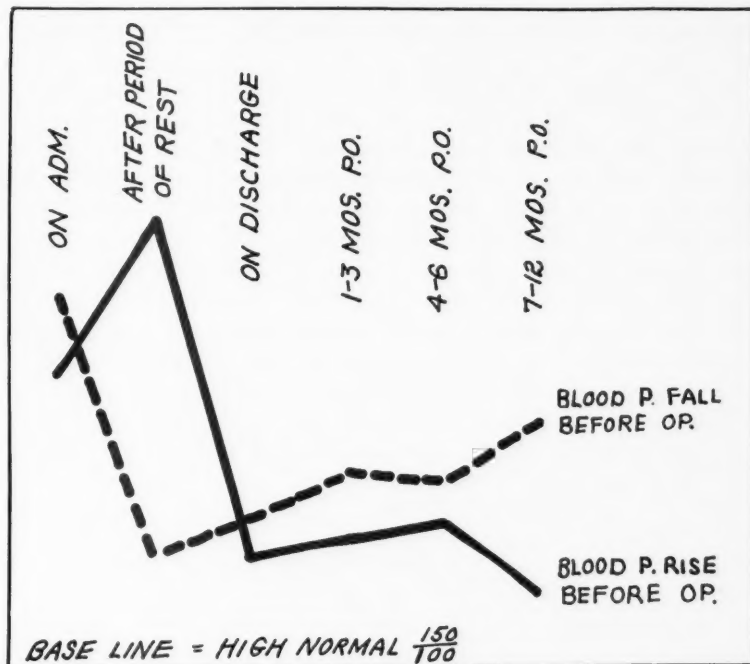


FIGURE 2: Effects of periods of rest in the hospital on the results of bilateral celiac ganglionectomy.

cases in which there was either a rise or no change in the pressure during the preoperative period, and the end results in 15 cases in which the blood pressure fell before operation. Table VI shows that there is no significant difference between the results in these two groups of cases (Fig. 2).

An interesting observation is that of this total group of 30 patients six died at varying periods after they left the hospital, and that in three of these six cases the blood pressure had decreased during the preoperative period.

### OPERABILITY

Our analysis of the follow-up data has shown that neither the age of the patient, nor the duration of the disease, nor the condition of the heart, nor the finding that the disease has entered the malignant phase, nor the

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effects of sedation is a contraindication to celiac ganglionectomy. In our last series of 112 cases of celiac ganglionectomies there has been no death from apoplexy, and no death from heart failure. We have thought that the only contraindication for the operation was impaired kidney function. The early results in two cases in which glomerulonephritis was associated with essential hypertension, however, lead us to believe that even this criterion may be negated.

While it is too early to make any final judgment regarding the true end results of celiac ganglionectomy, the almost complete symptomatic relief, the improvement in blood pressure in the first year after the operation, and the fact that many patients are able to return to their usual occupation make it appear that the operation of bilateral celiac ganglionectomy is well worth while.

## TREATMENT OF CENTRAL OR INTRACAPSULAR FRACTURES OF THE NECK OF THE FEMUR

JAMES A. DICKSON, M.D.

In discussing fractures of the upper end of the femur, it is very important to differentiate between intertrochanteric fractures and central or intracapsular fractures of the neck of the femur. In many of the large series of cases of fractures of the neck of the femur that have been reported, it has been shown that approximately 40 to 45 per cent are central fractures and that 55 to 60 per cent are intertrochanteric fractures. In intertrochanteric fractures, bony union may be expected if approximate anatomic apposition is maintained by casts or various forms of traction. In the central fractures of the neck of the femur, there has in the past been much doubt about securing osseous union. It is about the treatment of this group that I wish to direct my remarks.

Prior to 1904, it was considered that central or intracapsular fractures would not unite by osseous union, it being assumed that this type of fracture was essentially an attribute of old age. Stimson in his "Practical Treatise on Fractures and Dislocations" in 1910, stated "restoration of function is rarely to be attempted or even sought," and Pye in his book called "Surgical Handicraft" stated "the patient should be propped up in bed with the limb between sand bags. After about a month, the patient should be encouraged to use the leg as much as possible since union is not aimed at."

In 1904, Doctor Royal Whitman first described the abduction method of reduction and fixation by use of a plaster of paris spica and he demonstrated that osseous union could be secured. Obviously, the Whitman method was the first and possibly the greatest advance that had been made in the treatment of this fracture. By proper use of the Whitman treatment by abduction, the mortality rate from bed sores and static congestion of the lungs was greatly minimized. Although certain clinics reported that osseous union followed the use of the abduction treatment in as high as 65 per cent of the cases, reports of the Committee on Fractures of the American Orthopaedic Association in 1929, reviewing the results from several clinics, showed that osseous union was secured in only 50.4 per cent. This certainly left much to be desired, as a long confinement in a plaster cast was necessary before osseous union could be determined and often permanent restriction of movement of the hip and knee resulted.

Sufficient data have now been accumulated to prove that better results can be obtained by the use of internal fixation than by the closed reduction followed by prolonged rest in a spica cast. The operative treatment of fractures of the hip has constituted a very distinct advancement and

## JAMES A. DICKSON

has been brought to our attention chiefly through the work of Smith-Petersen of Boston, Johansson of Gothenberg, Sweden, King of Melbourne, Australia, and others.

In 1925, Smith-Petersen introduced a three flanged nail which he placed through the neck of the femur by means of a wide exposure of the hip joint. Although this method of treatment obviously had many advantages, it was not adopted immediately as it was felt that this procedure was too formidable. At the time of introduction of this method, lateral roentgenograms of the hip were not available, so that rather an extensive exposure of the hip joint was necessary in order to insert the nail accurately. However, since lateral roentgenograms of the hip have been possible, a very definite advance has been made in the treatment of fractures in this region, as the nail can be inserted by the so-called "blind nailing" through a small incision over the trochanter.

Since the advent of adequate methods of roentgen study, many types of internal fixation have been used, such as multiple pins and screws, which have maintained position of the fracture until union has taken place. Probably, however, the most generally accepted method at the present time is the Smith-Petersen three flanged nail which gives adequate fixation, prevents rotation of the head, and allows impaction of the fragments, all of which are essential in procuring osseous union. Internal fixation has been used in several series where bony union has been procured in as high as ninety per cent of the cases.

In addition, probably one of the most important factors in procuring union is an accurate reduction, and it was not until lateral roentgenograms were available that we could be certain that the reduction was satisfactory. However, a perfect reduction is not all that is necessary. Immobilization in cases treated by the Whitman method, where it has been shown that a perfect reduction has been obtained, does not give the percentage of good results that are obtained where the Smith-Petersen nail has been employed. Unquestionably, treatment in the cast permits a certain amount of movement at the site of fracture and it must be that this more thorough immobilization with the Smith-Petersen pin, together with the degree of impaction that is obtained, brings about the more satisfactory results.

During the last year, we have used internal fixation in this type of fracture and our results have been most gratifying. By the method that we have adopted, the patient is placed on a fracture table and given avertin anesthesia supplemented with gas and oxygen. The good leg is fixed in flexion at a right angle to a standard attached to the table. This is done to facilitate the making of the lateral roentgenograms during the operation. The fractured hip is then reduced by the Lead-



## CENTRAL OR INTRACAPSULAR FRACTURES OF NECK OF THE FEMUR

better-Whitman method, using the palm heel test to make certain the fracture is completely reduced. The leg is then fixed in slight abduction and full internal rotation to the foot piece of the Hawley table. A lead marker is placed on the skin halfway between the pubis and the anterior superior spine, approximately over the head of the femur. Lateral and anteroposterior roentgenograms are taken to determine if a satisfactory reduction has been made. When this has been accomplished, an incision about three and one-half to four inches long is made on the outer side of the shaft, starting just below the trochanter. The shaft of the femur is exposed and, using the lower ridge of the trochanter as a guide, a small calibrated Steinman pin is inserted into the center of the shaft about one and one-half inches below this ridge. The position of the marker over the head of the femur is determined from the anteroposterior roentgenograms and the pin is directed toward the center of the head and inserted for a distance of about three and one-half inches. With the leg held in internal rotation, the neck of the femur is invariably parallel to the top of the operating table. Any variation from this position can be determined by the preliminary lateral roentgenogram. After the pin is inserted, additional roentgenograms, both anteroposterior and lateral, are taken to determine the position of the pin and, if this is found satisfactory, a Smith-Petersen nail is threaded over or alongside of the wire, depending upon the type of nail used. In some cases, we have nailed the hip without the guide, but it is my impression that there is a definite advantage in its use, as it prevents any tendency for the head of the femur to rotate during the insertion of the nail. The length of the nail that is required can be accurately determined by the length of the calibrated pin that is still protruding from the wound. Final roentgenograms, both anteroposterior and lateral, are taken to check on the position of the nail. When this is satisfactory, the fracture is impacted. A thorough impaction is important to bring the fragments closer together and aid in re-vascularization of the fracture line. It is very important that the direction of the nail be in a position of valgus so that the head fragment sits on the top of the pin. In this way, there will be no shearing force when the patient begins to take weight on the leg and there will be a tendency, if anything, for the head to thread down on the nail and further impact the fracture.

After the wound is closed, a plaster boot is applied, to which a board is fixed so that the foot is maintained in internal rotation.

The postoperative nursing care is quite readily managed as the patient invariably has no pain in the fractured hip. The patient can sit up with a back rest if necessary and can easily be turned and moved in bed for all nursing care. Some workers advocate getting the patient out of bed in a few days but this has seemed a little radical and expecting a little too much of the Smith-Petersen nail. At the end of three weeks,

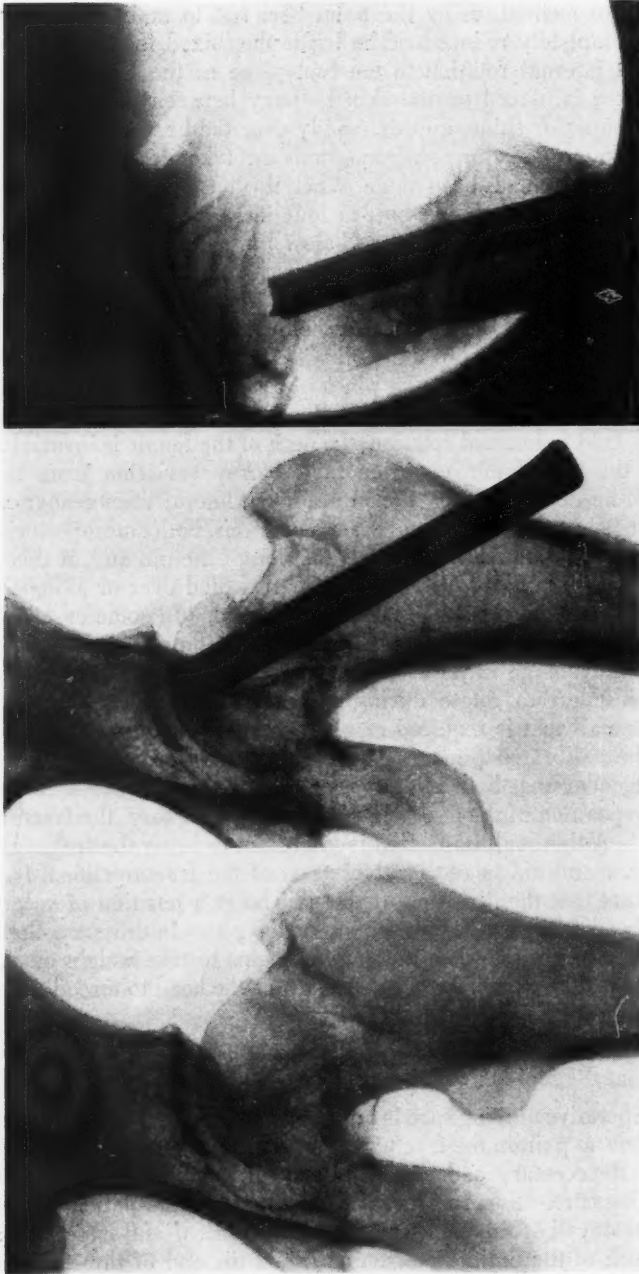


FIGURE 1: Patient 64 years of age.

A. Central fracture of neck of left femur.

B. and C. Anteroposterior and lateral roentgenograms taken 10 weeks after operation, showing nail in position and satisfactory union taking place. The nail was a little too long but this did not give rise to any inconvenience.

## CENTRAL OR INTRACAPSULAR FRACTURES OF NECK OF THE FEMUR



FIGURE 2: Patient 74 years of age.

A. Central fracture of right hip.  
B. and C. Anteroposterior and lateral roentgenograms taken 6 months after operation, showing position of nail. Excellent union has taken place.

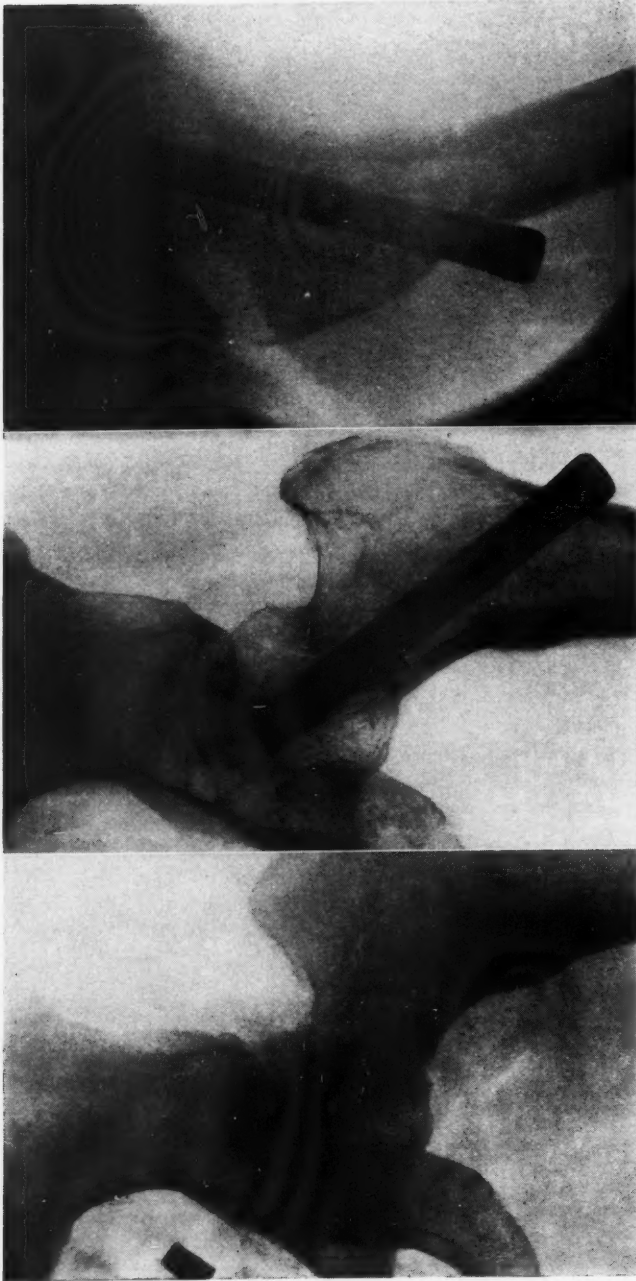


FIGURE 3: Patient 72 years of age.  
A. Reduction of central fracture of neck of left femur with lead skin marker in place, before insertion of calibrated guide.  
B. and C. Anteroposterior and lateral roentgenograms taken 5 months after operation, showing solid union of the fracture.

## CENTRAL OR INTRACAPSULAR FRACTURES OF NECK OF THE FEMUR

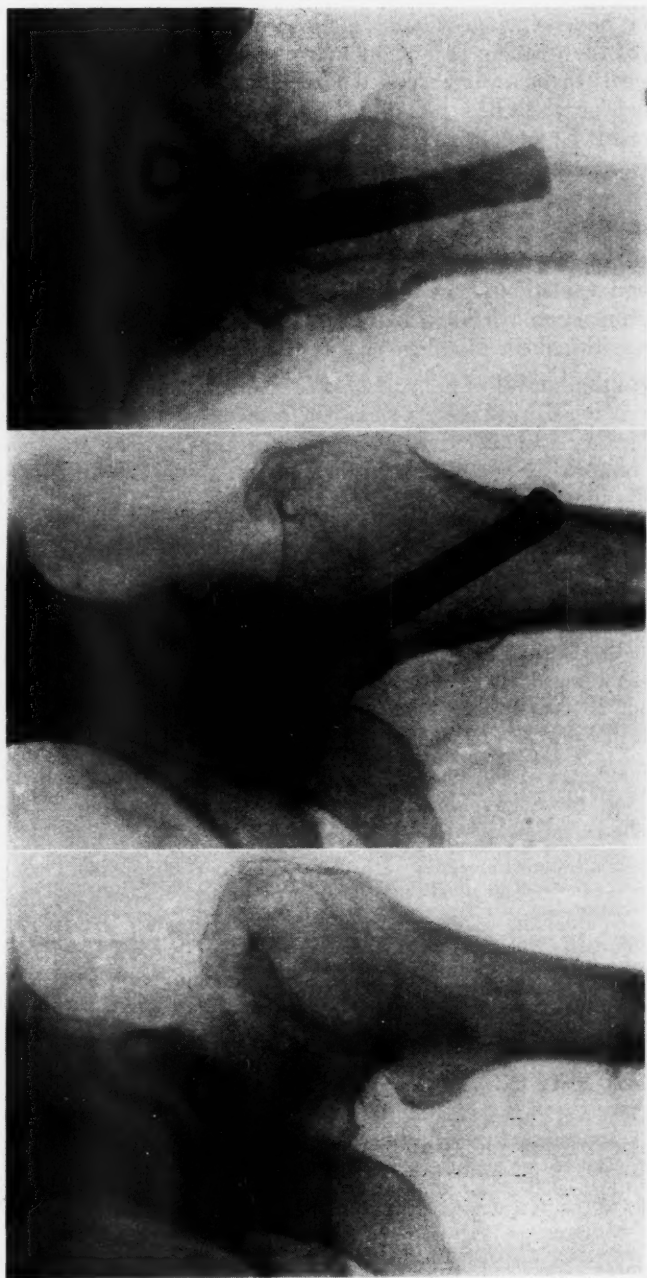


FIGURE 4: Patient 70 years of age.

A. Central fracture of left femur.  
B. and C. Anteroposterior and lateral roentgenograms taken 7 months after operation, showing pin in position with firm bony union of the fracture.

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the plaster boot is removed and the patient is encouraged to start exercises of the quadriceps and to increase voluntary motions of the hip and knee. In the seventh week, the patient is allowed to sit out of bed or over the edge of the bed so that the knee can be exercised. At the end of eight weeks, the patient is encouraged to walk and have weight bearing with the aid of a walker. Activity is increased from this stage, using crutches for a while and gradually discontinuing use of them entirely.

It would appear that satisfactory results from the operation depend upon a good reduction of the hip, the proper insertion of the nail, and thorough impaction of the fracture. It is extremely important that adequate facilities be available to carry out this procedure satisfactorily.

In regard to removal of the nail, this can be very readily done at any time after it is felt that the nail has performed its function and good bony repair has been procured. There would appear to be no urgency about its removal as we have seen no reaction about it and there has been no discomfort from leaving it in position.

During the last twelve months, we have used this method in 18 cases with the most encouraging results and, although it is as yet too early to assess the end results, 12 of the 18 have shown excellent bony union; the other 6 are still under treatment and appear to be healing satisfactorily. In this series, there have been no infections and no fatalities. The age of the patients has ranged from 64 to 80 years, the average age being about 73 years. The roentgenograms in four cases in this series are shown in Figures 1, 2, 3, and 4.

The advantages of the internal fixation over the Whitman abduction method—and these have been borne out in our experiences—would appear to be as follows:

1. There is a lessened mortality rate, due to the fact that complete immobilization is not necessary and the patient is confined to bed a shorter time.
2. There is a definite lessening of the period of hospitalization and cost of nursing care.
3. The patient can be out of bed in a few weeks without danger of dislodging the fragments for, at a certain stage, activity is helpful and weight bearing beneficial in producing an impaction. The position of the pin prevents a dislodgment of the fragments.
4. Stiffness about the involved hip and knee is very seldom seen when internal fixation is used.
5. It is only necessary to follow one or two of the cases to be convinced of the efficacy of this method of treatment. The patients' morale is so much better than when a cast is used. They are perfectly comfortable and can move about in the bed with ease and without pain.
6. The end results are far superior, increasing a fifty per cent chance of union to approximately ninety per cent.



## THE TREATMENT OF DEAFNESS

PAUL M. MOORE, M.D.

The treatment of the deaf patient has for its objective, first, the improvement of hearing, second, the prevention of further hearing loss, and third, the development of the patient's morale. All three are important but the third is forgotten all too frequently when the first two have failed. When these first two objectives cannot be attained and the unfortunate patient is doomed to a world of ever-increasing silence, he needs the help of his physician more than ever.

The first objective, the improvement of hearing, is perhaps the most difficult to attain. It is of the utmost importance that the patient be seen as early as possible after the onset of deafness. If the case is one of nerve deafness or otosclerosis, even this is of no avail. If the hearing tests do give the classic findings of a nerve deafness, a positive Rinne test associated with loss of the high tones and retention of the low tones, the patient should receive a few inflations of the eustachian tube. It has been found that, following treatment, a certain percentage of these patients will regain a large part of the hearing lost. It is not known just what the condition under these circumstances is but it must mean that there is no real involvement of the organ of Corti or of the nerve, but rather a disturbance of the delicate balance of the mechanism of hearing due to improper ventilation through the eustachian tube.

If the findings are those of a conductive deafness, a *negative* Rinne test associated with loss of the low tones, and if there is some obstruction in the eustachian tube, there is an excellent possibility that the hearing may be improved. On the other hand, if the eustachian tube shows no obstruction, treatment will probably be of no value.

No examination of the ear is complete without a careful study of the eustachian tubes. The openings in the nasopharynx must be carefully studied with the postnasal mirror and the nasopharyngoscope. There may be adhesions in the nasopharynx or a mass of adenoid tissue encroaching on the opening. An early malignancy or a benign growth may be present. The lips of the tube may be inflamed and swollen because of a chronic infection in the nasopharynx or because of a purulent drainage from an infected sinus. The eustachian tube should be inflated to determine whether it is obstructed.

Nor should examination of the nose and throat be neglected. A suppurative sinusitis may be responsible for the condition in the ear. A deviated septum may so interfere with the normal ventilation of the nose and ear that the eustachian tube becomes the seat of a pathological process. Infected tonsils may also tend to produce and maintain an inflammatory process in the surrounding tissues and so con-

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tribute to the deafness. Nasal allergy is a definite factor in some cases and, when present, should be treated because it may definitely interfere with proper ventilation or tend to prolong an infection in the sinus.

One should carefully evaluate the findings and eliminate those structural defects and infectious processes which seem to have a direct bearing on the case. If active infection is present, this should receive the first attention. The infected sinuses should be irrigated and cleared up. The infection in the nasopharynx should be treated by direct application of a 20 per cent solution of argyrol or Massier's solution. The direct application of a solution of 3 per cent ephedrine or 20 per cent argyrol to the eustachian opening is often of great benefit. Nasal sprays or drops should be prescribed for the patient's use at home.

The eustachian tubes should never be inflated in the presence of an active infection because such a procedure is likely to blow infected material into the middle ear and set up a suppurative otitis media. After the active infection has subsided, the tubes should be inflated at regular intervals of four days to a week until the maximum improvement has been attained or hope of improvement has been abandoned. If there is no improvement after five or six treatments, further inflations are useless.

The inflation should be made by the eustachian catheter. All manipulations must be very gentle for, if there is any trauma, further edema and closure of the tube will ensue. An anesthetic spray with a solution of 2 per cent cocaine or  $\frac{1}{2}$  per cent pantocain should precede the manipulations.

I am convinced that a great many cases of advanced conductive deafness in later life are due to neglected episodes in childhood and early maturity. Repeated colds accompanied by a slight otalgia and deafness occur. These individual episodes are so slight that they are neglected and so the individual goes on, each insult leaving its mark on the mechanism of the ear. Inflations are out of the question during the acute attack, but the nose and nasopharynx should be treated. If even slight deafness or stuffiness persists after subsidence of the active infection, the ear should be inflated. The most important development in recent years is the periodic testing of the hearing of school children. This is now done in most of the larger centers and many of the smaller communities. It should be extended until every school child can be tested and watched. In many communities where this procedure has been instituted, some degree of deafness has been found in about 13 per cent of the children tested. In most instances, the child had been thought to be normal before the test. These children would have been neglected and would, in all probability, have had gradually increasing deafness as they grew older. This is the only way that the incipient

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early loss of hearing can be detected in the majority of children. When it has been found, the child should be carefully examined and treatment instituted for the correction of the defect and prevention of further loss of hearing. It is to be hoped that this procedure will become universal and that, by careful special examinations and treatment, we may be able to materially reduce the number of individuals who are hopelessly deaf.

We must strive for the second objective, the prevention of further hearing loss, in that group of patients in whom the damage already done is such that improvement cannot be obtained.

In patients with early nerve deafness, all foci of infection should be removed. A careful survey should be made to detect any habits or medications that might have a toxic effect on the acoustic nerve. The Wassermann reaction of the blood should always be determined and, if lues is found, it should receive adequate treatment. Over-indulgence in tobacco or alcohol should be controlled. The use of quinine is another factor which should be checked.

The cases of subacute and chronic otorrhea also fall in this group. The longer the otorrhea is allowed to exist, the greater the loss of hearing will become. In the acute stages, it is better to do a myringotomy very early rather than to allow a spontaneous rupture to occur. The clean surgical wound will leave much less scar than the irregular necrotic hole of the rupture. Therefore, it is less likely to produce hearing loss later. The otorrhea should not be allowed to continue indefinitely. If conservative measures fail to clear it up in a few months, the mastoid should be operated upon. A chronic suppurative otitis media and mastoiditis invariably destroy hearing.

Unfortunately, we are still unable to improve the hearing in the majority of the patients who come to us. The loss of hearing is usually too far advanced and the pathology too well established. These patients should be told frankly that there is no known form of treatment which will improve their hearing, but one should not stop there. It is not enough to render a diagnosis and say there is no treatment. The deaf person almost invariably has an attitude of defeatism and he is greatly in need of psychological guidance. He feels that he is a burden to his friends and that he appears stupid to strangers. He tends to remain aloof from human contacts and becomes more and more introspective. He is sadly in need of help. A great deal of urging and skillful guidance are necessary if he is to overcome his handicap. If he can be persuaded to take up lip reading and if he becomes proficient at it, there will be the greatest change in his outlook on life. He again becomes self-reliant and meets life and people.

The hearing device is not yet accepted as we accept glasses. The

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patient who wears one still feels that he is a marked man. The mechanical devices are of value to the patient who has a great loss of hearing unless the deafness is of the nerve type. If the hearing loss is only moderate, the individual is annoyed by the static and other extraneous noises that still exist in the machines. If he will not or cannot take up lip reading and if his deafness is of the right type and of sufficient intensity, he should be urged to acquire one of the better makes of electrical hearing devices.

Many are the forms of treatment advocated in the past which have proved disappointing. The electrophonoides of the Continent and its American equivalent have each been heralded by some as being of great benefit to all types of deafness. The majority of physicians who have used them have found them to be of little or no value. Massage of the drum by the use of alternating negative and positive pressure and treatment by infra-red and roentgen rays have failed to give results of any magnitude. The use of the eustachian bougie is losing favor. There is a definite feeling in a great many quarters that it traumatizes the tube and so results in more adhesions and greater obstruction. One of our leading otologists recently attacked even the inflation of the eustachian tube. He feels that this tends to blow particles of mucus into the middle ear and that these act as irritants to further increase the pathological process. I agree with him to the extent that such inflations should not be continued if no improvement in hearing can be shown, but I have seen too many patients definitely improved by this form of treatment to be willing to abandon it. I do feel that the blowing of medicated liquids into the ear may be harmful.

It is to be hoped that some of the more recent lines of investigation may give us a better understanding of the problem of deafness. The studies of the reaction current thrown off by the cochlea during stimulation by sound or the meticulous microscopic investigation of serial sections of the cochlea of patients who have had definitely recorded hearing loss may lead to some measure of solution. In the meantime, we must proceed clinically along the old established lines. The percentage of good results can be increased only if the patients come for treatment early.

## MANAGEMENT OF THE PATIENT WITH CATARACT

A. D. RUEDEMANN, M.D.

The problem of what to do for the patient with cataract is not always easy to solve and usually it is of considerable importance to the happiness and welfare of the patient. Naturally, the individual wishes to know the cause for the gradual loss of vision. Since cataracts often occur in patients outside the age limits of the senile group, another cause must be found in many instances.

It has been our experience that, after those changes in youngsters and young adults up to 40 years of age have been classified as hereditary, traumatic, or uveal, as the case may be, cataracts coming on in the next twenty years—from 40 to 60 years of age—usually are due to other causes.

The group of hereditary causes have all been classified and taken care of. Those due to trauma definitely become fewer in number but several new types appear. First, a group of early lens changes are seen in women who have had disturbances of the endocrine glands. These are not necessarily limited to those patients who have had thyroidectomies and postoperative tetany, but there is a fair number of patients who have a mild form of hypoparathyroidism with definite lens changes. These patients may complain of recurrent ocular pain and transitory blurring of vision which is a forerunner of more definite changes. As a rule, this is due to a ciliary spasm associated with a mild Chvostek's or with Trousseau's sign. Fortunately, these cases are few in number and treatment can be instituted for the glandular disturbance which will arrest the progress of the lens changes.

A second group of adults have other endocrine disturbances, such as hypothyroidism, hypo-ovarianism (early menopausal changes), or hypoglandular changes. These do not necessarily come on following surgery, and it is good ophthalmology to have a competent endocrinologist make a thorough examination as he can often bring about marked alleviation of symptoms and, in many instances, avert the progress of the lens changes. In our experience, none of the lens changes which are already present have been cleared up.

A third group of patients have a nutritional disturbance that may not be ascertained easily. The patients give a history of longstanding malnutrition, faulty eating habits, or they have other evidence of vitamin deficiency such as a low vitamin A curve, peripheral neuritis, or minute petechial hemorrhages. This group comprises a very large number of patients—much larger than either of the first two. The reason for this is that many persons follow advice propounded by the

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newspapers and advertisers and often such advice is faulty. Many patients at the age of forty feel that they can eat as they please and, in addition, the mid-life "spread" alarms many so that they become fadists and adhere to reducing diets. These diets usually are unbalanced and do not contain the constituents required for a normal diet. In this group belong a small number of cases of what are probably cataracts of allergic origin, but it is rather difficult to differentiate between those of nutritional origin and those due to allergy as the cause may be primarily nutritional and secondarily allergic. Nevertheless, in those people with food allergy, it is well to subject them to a thorough study as they may suffer from faulty nutrition by lack of proper assimilation. Associated with the lens changes in this group of patients may be mild photophobia, a glandular type of conjunctivitis with some excessive lacrimation, and an almost constant ocular fatigue not attributable to a need for new glasses or a refractive error. By proper management, such patients become very comfortable, are able to read with less difficulty, and I believe the progress of their lens changes is retarded. I doubt that lens changes of this group once under way ever stop completely.

To this group also belong patients with diabetes and cataracts. Here there is an associated change in the lens that is certainly due to the diabetes. I do not believe this is caused by the excess sugar but probably is due to some other dietary disturbance secondary to the diabetes. Many of these patients have changes in the fundus as well. It is not always those with a high sugar level who have this disturbance but many with a low level of sugar tolerance have cataracts. Cataracts may develop in the diabetic patient and, since it is true that the ratio is slightly higher than in patients without diabetes, the diet must be watched carefully for, once under way, the lens changes usually go on to maturity and operation must eventually be performed.

Lens changes due to reducing medicine have not disappeared entirely as many of the tablets are still on the market and some of the lens changes now seen are due to the previous toxic absorption. If we were able to trace other medication more directly, undoubtedly most cases of cataract would fall in this group.

The local treatment of cataracts has been unsuccessful in our hands—the instillation of drops to halt the progress of cataracts has proved of little value in any instance.

The use of some medication is often advisable to control the disease, especially if there is any question of subsequent swelling of the lens. Most of the medication should be directed to building up the general condition of the patient and this should be in the hands of a competent endocrinologist. In cases of nutritional disturbance, some one with



## MANAGEMENT OF THE PATIENT WITH CATARACT

knowledge of the proper dietary regimen should direct the general treatment. Infrequently, a weak solution to dilate the pupil for central opacities can be used. However, there usually are diffuse or peripheral changes and, therefore, the patient is not benefited.

Glasses may be changed as frequently as necessary but, unless definitely beneficial or necessary from a visual point of view, a change should not be made. The other lens changes, due to trauma or infection, must be handled according to the needs of the patient. Cases of uveal cataract require careful study and treatment if the eyeball is to be conserved aside from the cataract. Frequently, complete general and local rest are all that are necessary to halt the progress of the disease and bring the patient to a condition suitable for surgery.

The time and type of surgery to be performed always present a problem. It is my belief that a cataract in a youngster should have a discussion so that it may be absorbed, and the youngster have the benefit of a reserve eye and a much better cosmetic appearance. The hazard is slight at this time and is much less than later when the cataract is more dense and will not absorb as readily or at all, and a regular linear extraction may be required later.

In those changes occurring later in life, the lens should be removed by a linear extraction or by a method equal to it in safety and ease.

Special care must be exercised when patients have diabetes or hypoparathyroidism. The former require adequate treatment of the diabetes if a good result is to be obtained; if the treatment is sufficient, then the surgical results are equally as good. The statement that diabetic patients cannot be operated upon with safety is wrong; however, they certainly are not so successfully operated upon as the others except as adequate care and correct management.

The patient with hypoparathyroidism may have a low calcium level and if so this must be restored to a fairly normal level to prevent a generalized convulsion which is disastrous. The level of the blood calcium on the day before operation should be known before surgery is undertaken. Before doing any eye operation, it is well to know the blood calcium on every patient who has had a thyroid operation.

The patient with hypertension and a cataract can be put at rest in the hospital for several days previous to surgery. When the blood pressure reaches a normal level for that individual, he can be operated upon with success equal to that secured in any other patient. There is a hazard, but it need not become a major one.

The routine culture for organisms in the conjunctiva should be made on all patients coming in for cataract surgery. There should also be a

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routine blood count and differential count in order to detect any unsuspected condition. The value of this is well illustrated by the case of a patient who came in for a cataract operation and was found to have lymphogenous leukemia which precluded operation at that time. Examination of the blood gave the following results: red cells, 3,400,000; white cells, 40,950; hemoglobin, 68 per cent; neutrophils, 9 per cent; lymphocytes, 91 per cent.

The level of the blood sugar should be known and regulated if necessary. A knowledge of the blood pressure is equally important.

A chronic cough should be treated if possible and the condition of the bowels should be known as well as the possibility of any urinary complication. The time to avoid trouble is before surgery is undertaken.

A bad mouth with abscessed teeth and pyorrhea should be cleared up. It is well to know that, if a complication occurs, all has been done to prevent it. These things may not be done and operation may still be performed, but over a long period of time visual results are not as good.

A degenerating globe on the opposite side should be removed. These old eyes may be the seat of low-grade uveitis and often cause trouble after operation.

Age is no factor in cataract surgery and the operation can be done at any time. The decision to undertake surgery belongs to the oculist, and the operation should not be deferred because a patient is too old. The factor of a fall and a broken hip must be weighed against the possible hazard of an operation. It is well to remember that old age and blindness are a most unhappy combination.

The surgery of cataract is so successfully done today that, with adequate preoperative care and fair technic, the average successful results are well over 90 per cent. No patient should be denied the opportunity for sight in his few remaining years except on the decision of a competent ophthalmologist. Remember that the patient in most instances is already blind so that the most that can happen is continued blindness and, with the marked success of cataract surgery, every patient should be allowed at least one trial for sight.

## DISSEMINATED, SUBCUTANEOUS, GUMMATOUS, ULCER- ATIVE SPOROTRICHOSIS (*S. schenckii-beurmannii*)

### *Report of a Case*

GEO. H. CURTIS, M.D.

Sporotrichosis was first reported in America in 1898, by Schenck<sup>1</sup>, who, with J. E. Smith, isolated the fungus from ulcerative gummatous lesions on the hand and arm and classified it as *Sporotrichum*. In 1912 de Beurmann<sup>2</sup> collected 200 cases from the world literature and published a comprehensive clinical, pathological, and bacteriological study of the disease. Since then many reports have appeared in the literature, among which Meyer<sup>3</sup> in 1915 recorded 82 cases in the United States. In his tabulation, there is one case of human and eight cases of horse infection occurring in Ohio. In 1926 Foerster<sup>4</sup> collected 148 cases, of which 130 occurred in the Mississippi and Missouri River Valleys. North and South Dakota, Wisconsin, Minnesota, Iowa, and Missouri present the greatest frequency of occurrence. Further search through the literature did not reveal additional cases of sporotrichosis reported from the State of Ohio.

Very frequently sporotrichosis is not recognized until it has progressed for many weeks or months. In this case, the diagnosis was made within twenty days after the appearance of the first lesion. Of further interest is the fact that no evidence or history of the portal of entry could be obtained. For these reasons it is believed that a report of this case would be of interest.

### REPORT OF CASE

A white minister, 54 years of age, came to the Clinic on November 3, 1937, with disseminated, subcutaneous nodules and cutaneous ulcers which had been present for fifteen days. The first lesion was noticed on the right hip. Within a few days, other lesions appeared in rapid succession over the entire trunk and extremities, and there was a nodule a little below and behind the right ear. The lesions seemed to appear in crops. The patient thought that he had two different diseases because some of the lesions seemed to be primarily cutaneous while others were much deeper. Within a week after its first appearance, a lesion on the inner side of the left knee had pointed and was lanced. The discharge was purulent and thick. The lesion showed no tendency to heal after a week, but continued to discharge. None of the lesions was tender or painful.

During August, the patient frequently went swimming in a creek and spent some time in his flower garden which did not contain any barberry bushes. His ministerial duties took him to a small church in the country but he did not come in close contact with horses, dogs, cats, etc. In October, about a week or ten days before the appearance of the first nodule, the patient noticed mild stiffness of the muscles and discomfort in the forearm and thighs but this was present only during activity.

The family, personal, and marital history was irrelevant.



FIGURE 1: A cutaneous ulcer on the medial aspect of the left leg, from which *Sporotrichum* was isolated. The black area at the popliteal space is the site of a biopsy.

Physical examination showed a slender but well developed and well nourished white man of average height. Varicose veins of the legs and the skin lesions were the only abnormalities. A roentgen examination of the chest revealed normal lung fields and old calcified mediastinal nodes.

*Examination of the Skin:* Twenty-four subcutaneous and cutaneous lesions

## SPOROTRICHOSIS

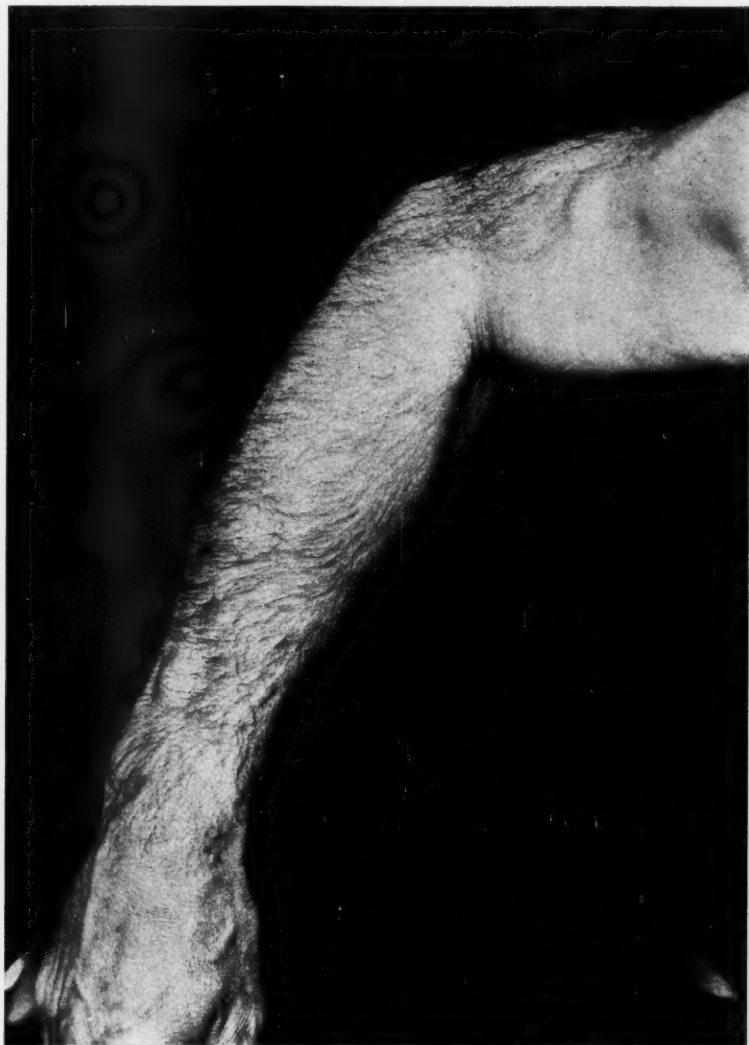


FIGURE 2: Subcutaneous nodules on the extensor surface of the right forearm and arm.

were disseminated bilaterally over the trunk and extremities, and there was one just behind and below the right ear. The subcutaneous nodules varied from the size of a pea to that of an English walnut. Some were freely movable while others seemed to be attached to the underlying fascia, and the epidermis above was normal in texture and color. Many of the nodules were elevated while others could be located only by palpation. The lesions were firm, irregular in shape, and not tender. Three nodules on the dorsum of the right



FIGURE 3: Superficial dermo-epidermis, scaling lesions on the right hip.

forearm were arranged in a somewhat linear fashion. Those lesions which involved the epidermis showed various stages of development, from beginning involvement of the epidermis which was of a slight pinkish color, to elevated, fluctuant, and pointing abscesses of a dull bluish-red color. A few of the smallest lesions, primarily involving the dermo-epidermis, were brighter red



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in color and were covered with a thin crust. Some of these appeared to be involuting. One cystic lesion on the lateral margin of the right foot was slightly tender to palpation. The ulcer on the right knee, which resulted from lancing of the abscess, had a central opening about 0.5 cm. in diameter, leading into a larger cup-shaped cavity. The periphery was indurated and faded imperceptibly into normal tissue as did the discoloration (Figs. 1, 2, and 3).

**Laboratory Examination:** Examination of the blood showed 4,650,000 red cells, 8,250 white cells, and 11 gm. hemoglobin per 100 cc. (71 per cent) with the Haden-Hauser hemoglobinometer. Differential count showed neutrophils, 58 per cent; eosinophils, 5 per cent; lymphocytes, 24 per cent; monocytes, 13 per cent; color index, 0.76; icterus index, 3; and fasting blood sugar 86 mg. per 100 cc. of blood. The urine was normal. The Wassermann and Kahn tests of the blood gave negative reactions. Lumbar puncture revealed normal spinal fluid with negative Wassermann and colloidal gold reactions.

Intradermal tests with old tuberculin in dilutions of 1:10,000 and 1:1,000 gave negative results; dilution of 1:100 gave a weakly positive reaction (erythema 2 cm. in diameter).

Blood taken on four successive days and the spinal fluid were cultured in Sabourraud's medium. The inoculated mediums remained sterile during the observation period of four weeks.

No bacteria or fungi (spores) were found in smears of the pus aspirated from the lesions stained by Gram's, Wright's and Ziehl-Neelsen stains.

Cultures of the pus on Sabourraud's medium showed a growth after four days, as minute mycelia seen only by a hands lens. The following is a description of the mycelial growth.\*

**Description of Growth of *Sporotrichum schenckii-beurmannii*:** Growth appeared on the fourth day as small, moist, flat, grayish-white colonies, less than 1 mm. in diameter. They grew rapidly, soon developing a very fine, downy surface. As their size increased, there developed on the surface near the center a dark, gray-brown pigmentation, and the colony, which until that time had been quite flat, began to show bulging at the center. As growth continued, the pigmentation spread toward the periphery, leaving a smooth, gray or creamy halo surrounding the bulging, dark, crinkled, circular mass. In about ten days, the colony was 3 to 4 mm. in diameter, with a rough, dark surface and a smooth, light-colored edge. In profile, the colony resembled a cone with a decided apex extending two or more millimeters above the surface of the agar slope. At the end of three weeks, the mycelia had become a deep black in the center, while the periphery retained its creamy halo (Fig. 4). Figure 5 is a photomicrograph of the hyphae with conidia.

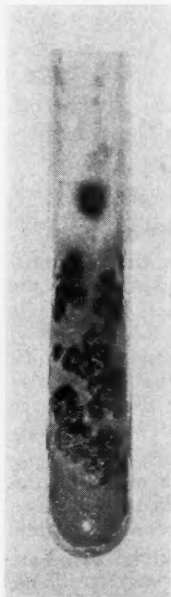


FIGURE 4: A culture tube showing mycelial growth on Sabourraud's media.

Histological examination was made of a pea-sized nodule with beginning abscess formation. The hematoxylin-eosin method was used for staining. The rete pegs of

\*The growth of the organism was followed by Mr. Alfred Reich of our clinical laboratories. The organism was identified as *S. schenckii-beurmannii* by Dr. Morris Moore, mycologist to the Barnard Free Skin and Cancer Hospital, St. Louis, Mo.



FIGURE 5: Photomicrograph of the hyphae showing the pear-shaped conidia situated along the sides and ends.

the epidermis directly above the abscess are somewhat elongated. A few mononuclear and polymorphonuclear cells are disseminated throughout the pickle cell layer. The horny layer appears normal. About the rete pegs and in the papillae is a moderate intercellular edema, mainly situated about dilated capillaries and arterioles. There is moderate infiltration in the papillae and upper corium, especially about the blood vessels, and this is composed of predominating mononuclear cells, a lesser number of polymorphonuclear cells, an occasional plasma cell, and a few scattered eosinophils. Toward the abscess, the infiltrate becomes more dense, the perivascular "cupping" more intense, and it dissects apart the connective tissue in large sheets along the vascular network. There is no tendency to encapsulation. Capillary proliferation may be seen in the peripheral and middle zones.

Roughly, a middle zone may be seen to be composed of a moderate proliferation of fixed tissue cells of epithelioid type. In one area there are two giant cells of the Langerhans type, but there is no definite tubercle formation.

Centrally, the edema and cellular infiltration, necrosis, and cellular debris are very marked. This is surrounded by frayed-out strands of connective tissue, the free ends of which show disintegration and necrosis. Several disintegrating coil glands are caught in the mass. The infiltrate is almost entirely made up of polymorphonuclear cells and their debris and a large number of eosinophils.

The histological picture is that of a granulomatous process involving the skin and subcutaneous tissue, with early abscess formation, combining the features of syphilis and tuberculosis to a moderate degree.

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*Course:* At no time during the onset and course of the disease has the patient showed any toxic symptoms except for the mild aching of the muscles of the extremities. As soon as the diagnosis was confirmed by culture of the organism, the patient was given a saturated solution of potassium iodide by mouth, beginning with one gram daily in divided doses and rapidly increasing the dose to four grams daily. The patient tolerated four grams a day very well. The ulcerations and lesions that discharged through the openings made by the aspiration needle were dressed daily with a 5 per cent iodine ointment. Within a week after treatment was begun, a definite healing of the ulcers and involution of the subcutaneous nodules was in progress. After a month, the lesions had practically disappeared and no new ones had appeared. Treatment is to be continued for a month or six weeks after all signs of the lesions have disappeared.

## DIAGNOSIS

Since the diagnosis in this case was made and treatment was started early in the course of the disease, the differential diagnosis was limited to four possible conditions: Pyogenic infection, syphilis, tuberculosis (tuberculosis colliquativa), and other mycotic infections.

The principal features in the differential diagnosis suggested in this case may be listed in the following manner:

1. The appearance of bilaterally disseminated subcutaneous and cutaneous lesions in rapid succession, suggesting a hematogenous distribution in a healthy person.
2. Absence of a history of previous infection or portal of entry.
3. Indolent evolution of the lesions with minimal inflammatory signs and symptoms simulating cold abscesses.
4. Normal hemogram except for the 5 per cent eosinophilia.
5. Repeatedly negative blood Wassermann and Kahn reactions.
6. Repeatedly negative blood cultures.
7. Negative tuberculin test except in strong concentration.
8. Absence of pyogenic organisms in smears and cultures of the pus.
9. Guinea pig inoculation negative for tubercle bacillus.
10. Abundant growth of *Sporotrichum* from the pus on Sabourraud's medium.

In furunculosis, the lesions have a predilection for the back of the neck, axillae, groins, inside of the thighs, and buttocks. Although subcutaneous and cutaneous, the lesions usually mature rapidly and present all the signs of acute inflammation, point, and discharge within a week. If "blind" boils occur, the pain and tenderness, color and evolution are more prominent than in sporotrichotic lesions. *Staphylococcus albus* is almost always present in smears and cultures. A furuncle usually presents a core that is not present in sporotrichotic

lesions. The regional adenopathy of furunculosis is rare in sporotrichosis.

Pyemia is a much more serious disease which usually follows a previous infection such as thrombophlebitis, pneumonia, infections of the upper respiratory and accessory respiratory tract and presents symptoms of toxemia and signs of septicemia. The causative organism is usually recovered from the blood stream and cutaneous abscesses. Moderate to severe anemia and leukopenia are usually manifested but with a marked increase in the number of polymorphonuclear leukocytes. Eosinophilia is extremely rare. The evolution of the cutaneous abscesses is similar to that of furunculosis.

Due to the fact that the diagnosis was made early in this case, there was only a superficial resemblance to the late lesions of syphilis, i.e., nodular cutaneous, and gummatous syphiloderm. There was no history of previous syphilitic infection in the patient. The Wassermann and Kahn tests gave negative reactions and remained so even after a month of administration of potassium iodide. The lesions of syphilis tend to be localized by trauma to the scalp, face, elbows, buttocks, and legs and are asymmetrical and very rarely disseminated. These lesions tend to ulcerate and enlarge by peripheral occurrence of new nodules forming serpiginous, scalloped, horseshoe or letter S patterns with a dull red or "ham" color and punched-out edges. This evolution usually occupies a period of months while the sporotrichotic gumma evolve in a matter of weeks. The ulcers of the latter disease are "crater" or cup-shaped with overhanging edges, of a brighter red or more livid color, and do not tend to enlarge. If the syphilitic lesions are situated over or involve a nerve trunk or nonelastic site, there is a tendency to pain of varying degree, while lesions of sporotrichosis are usually not as painful, if situated in similar locations.

This form of sporotrichosis resembles scrofulous gummata (tuberculosis colliquativa) more closely than any other scrofulous form of cutaneous tuberculosis, more specifically the very rare disseminated type of subcutaneous tuberculosis colliquativa. Children are more frequently affected than adults and a focus from which hematogenous dissemination occurs is usually found. In adults, the sites of predilection are the face, neck, areas over bony projections and epiphyseal regions, although lesions may occur anywhere in the subcutaneous tissue. The evolution of the gumma requires several months before it reaches the skin and ulcerates. The lesions are often painful and the overlying skin is of livid red or purplish color. The center shows signs of regression while, at the periphery, the inflammatory zone is more prominent. The edges are thin, frayed out, undermined, and irregular in outline. The base is dirty and granular, and the discharge is purulent and thin.

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Tests of the skin with tuberculin usually give strongly positive reactions and in most instances tubercle bacilli are demonstrated in smears or by guinea pig inoculation. Histologically, the usual picture of tubercles is almost always in evidence.

The chief mycoses, occurring in the Middle West, that must be differentiated from sporotrichosis are actinomycosis and blastomycosis. First and most important, these are differentiated by finding the organisms in smears and on culture. The finding of the sulphur granules in the discharge establishes the diagnosis of actinomycosis, while the presence of budding, double-contoured, yeast-like organisms in the tissues and pus designates blastomycosis. Sporotrichum is rarely and most difficulty found in the pus, while luxuriant growth on culture is the rule. In blastomycosis and actinomycosis, the multiple subcutaneous and cutaneous lesions are secondary to a primary focus of systemic or visceral origin. Their evolution is more rapid than that of sporotrichotic lesions, and the individual lesions enlarge by peripheral extension of miliary abscesses.

### GENERAL CONSIDERATIONS

*Etiologic and Mycological Aspects:* Sporotrichosis is a subacute or chronic disease due to the vegetable fungus of the genus *Sporotrichum*. The disease is primarily a cutaneous and subcutaneous infection but it may be systemic as no organ or tissue is immune. The principal organism producing human infection is *S. schenckii-beurmannii*. The description given elsewhere is brief but may be found in more detail in special articles<sup>5,6</sup>. The organism is best grown on Sabourraud's medium consisting of peptone 1 per cent, glucose 4 per cent, agar 1.5 per cent, distilled water 100.0 cc. The pus aspirated from the abscesses under aseptic conditions is inoculated into the media and growth appears in from 4 to 10 days.

Infection in humans may occur by inoculation of the spores on vegetable matter and plants into a wound or abrasion or from animals, fur, bites, etc., and may be transmitted from man to man by direct contact with the pus or vectors.

*Clinical types of the disease:* The disease may be divided into the following four types:

1. **Localized lymphangitic:** This is the most commonly encountered type in America and is characterized by an initial infection through trauma on the exposed parts, usually the hands, which is the sporotrichotic chancre. From a few days to several weeks following the appearance of the chancre, the disease extends along the regional lymphatics with formation of thickened vessels and subcutaneous gummas which ulcerate.

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2. Disseminated, subcutaneous, gummatous type: This variety is most frequently met with in France and is manifested by disseminated, painless, subcutaneous nodules that evolute to involve the skin in from 3 to 6 weeks. In the untreated patient, new lesions continue to appear indefinitely. These lesions rarely ulcerate spontaneously unless traumatized.

3. Disseminated ulcerative: The lesions of this type evolute as in the preceding variety but primarily involve the skin and ulcerate spontaneously. Types 2 and 3 most often resemble syphilis and tuberculosis.

The case presented in this report represents a combination of the preceding two forms as noted by the presence of deep subcutaneous nodules and superficial dermo-epidermic nodules and ulcerations. Hematogenous dissemination has not been demonstrated in these types.

4. Systemic: In this type, there may be involvement of the mucous membranes of the upper alimentary and respiratory tracts, the muscles and glands, the bones and joints, especially the tibia, epididymis, lungs, gastro-intestinal tract, and cerebrospinal system. The symptomatology is governed by the various systems involved.

### TREATMENT

Potassium iodide is practically specific for the disease. It is usually administered orally as a saturated solution. The dosage begins with 15 drops daily and rapidly ascends to tolerance and continues at a dosage just below tolerance for about six weeks after all visible clinical signs of the disease have subsided. If intolerance to oral administration occurs, iodine in the form of Lugol's solution, tincture of iodine, or sodium iodide may be given orally, intravenously, or by rectum. When given orally, tolerance may be materially enhanced by small doses of tincture of belladonna.

Local treatment of the abscesses and ulcerations consists of daily irrigation with Lugol's solution, moist compresses, or ointments containing iodine up to 5 per cent. Surgery is usually contraindicated. Superficial roentgen therapy hastens the involution and absorption of the subcutaneous and cutaneous lesions.

### SUMMARY

A case of disseminated, subcutaneous, gummatous, ulcerative sporotrichosis is reported. It is believed that this is the second case of human infection reported in the literature as occurring in Ohio. The first case was reported in 1911 and recorded by Meyer<sup>3</sup> in 1915. The diagnosis in our case was suspected within 15 days and confirmed by culture within 20 days after the appearance of the first lesion. The disease responded rapidly to treatment with potassium iodide and,



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although the elapsed time is too short to determine the ultimate course of the disease, it is felt that a permanent cure will be obtained.

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## THE USE OF DIURETICS IN BRIGHT'S DISEASE

R. H. McDONALD, M. D.

Diuretics are substances which increase the volume of the urine by some modification of the complicated process by which urine is formed. Part of this process takes place outside the kidney, beginning with the absorption of fluid from the alimentary canal, and various metabolic processes take place in the tissues before urine is actually elaborated in the kidney. Diuretics, therefore, may be renal or extrarenal in their action. The mode of action and the site of action, in the case of most diuretics, is at best uncertain and may occur at various points in the tissues or tissue fluids, in the capillary walls or blood itself, in the general circulation or renal circulation, as well as in the renal tubules and glomeruli.

The generally accepted modern theory of renal secretion as formulated by Cushny offers a basis for a classification of diuretic agents which Solis-Cohen<sup>1</sup> suggested. According to this theory, there occurs a simple diffusion through the glomerular tufts of all the diffusible substances contained in the blood, the same proportion and concentration being retained. This filtrate then passes into the tubules where there is a resorption of most of the water and all or a great part of certain of the dissolved constituents of this glomerular filtrate. The residue of water, together with those dissolved substances which are not reabsorbed, constitute the urine. The reabsorbed substances are known as threshold substances, inasmuch as they appear in the excreted urine only when their concentration in the blood and hence in the glomerular filtrate exceeds an approximately fixed or threshold percentage. Substances such as sugar are normally not found in the urine during a state of health, since they rarely reach the level of overflow. An exception to this is seen in the so-called renal diabetes in which the renal threshold for sugar is apparently very low. Other substances, such as sodium chloride, are fairly constantly present in quantities above the threshold and consequently are excreted. The renal waste substances, chiefly urea, uric acid, creatinine, urates, phosphates, etc., which constitute the most characteristic constituents of urine, are not reabsorbed but appear in the urine in the same absolute quantity as in the filtrate and in much greater proportion.

The volume of urine secreted depends chiefly upon the following factors:

1. The quantity of renal circulation at any given time. This is dependent upon the general circulation as well as on the degree of contraction or dilatation of the renal vessels. It has been shown definitely that normally only a fraction of the glomeruli are active at any one

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time. Theoretically, any substance which would increase the number of active glomerular units should increase urinary secretion.

2. The osmotic pressure exerted by the colloids of the blood. The greater the concentration of colloids in the blood, the more difficult it is for water and diffusible substances to escape through the glomeruli and, conversely, the more the dilution of the blood colloids, the more readily will a glomerular filtrate be formed.

3. The concentration of the filtrate itself. The more concentrated the filtrate, the less readily is water removed from it by reabsorption, due to the increased osmotic pressure within the tubule which tends to prevent passage of water back into the renal vessels.

4. The rapidity of flow in the tubules must introduce a mechanical element into the amount of urine secreted, since the greater the time allowed for reabsorption, the more complete this must necessarily be.

Diuretic agents may act in a number of different ways to modify the factors normally active in the production of urine. In general, they fall into distinct classes, as outlined by Solis-Cohen<sup>1</sup>:

1. Those agents which act upon the circulatory system, causing an increased flow of blood through the kidney, providing greater opportunity for glomerular filtration, and possibly resulting in increased activity of a greater proportion of the glomeruli at one time. The most important representatives of this group are digitalis, squill, strophanthin, and probably alcohol.

2. Agents acting directly on the kidney, increasing the permeability of the glomerular membrane for water or lessening reabsorption in the tubules. The chief representatives of this group are a number of purine derivatives, each of which contains the xanthine nucleus, notably caffeine, a trimethyl xanthine, and theobromine and theophylline, both dimethyl xanthines. The chief effect of caffeine is a stimulation of the entire nervous system and, in addition to its use as a diuretic, it is also used as a cardiorespiratory stimulant. The increased nervous irritability which results from its use is frequently a factor mitigating against its use as a diuretic and, for this reason, theobromine and theophylline have frequently been substituted. Theobromine is a dimethyl xanthine occurring naturally in cocoa. It is quite insoluble in water but its two soluble salts have been used. These are diuretin which is sodium theobromine salicylate and agurin or sodium theobromine acetate. Theophylline, or theocine in its synthetic form, is more prompt than caffeine or theobromine in its diuretic action, but its effect is less lasting. Like theobromine, it has little or no stimulating effect on the central nervous system. In contrast to caffeine, small doses are believed to cause coronary dilatation. The

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oral dosages ordinarily employed are caffeine, two to five grains; caffeine citrate, two to eight grains; caffeine sodium benzoate, five grains; theobromine, five to eight grains; theobromine sodium salicylate or diuretin, ten to twenty grains; theobromine sodium acetate or agurin, eight to fifteen grains; theophylline or theocine, three to six grains; theophylline sodium acetate, two to eight grains.

3. Hydremic diuretics which act upon the blood, increasing the amount of water available for excretion. There are three subgroups:

a. Water alone acts by diluting the blood, lessening the amount of both crystalloids and colloids, and thus allowing a more ready diffusion through the glomerular capsule.

b. Those agents which increase the concentration of the blood crystalloids, raising the osmotic tension of the blood, and thus withdrawing water from the tissues. This group includes all the so-called saline diuretics, acetates, chlorides, citrates, lactates, nitrates, sulphates, etc., as well as urea and sugars.

c. Those agents which apparently act upon the plasma colloids, lessening their avidity for water. The mercurials, such as calomel, and the organic mercury compounds, novasurol and salyrgan, act in this way. A combination of a mercurial and purine diuretic has been prepared under the trade name of mercupurin and a chemically related drug, mercurin, has been prepared in the form of a suppository.

A rather miscellaneous group of diuretics is composed of the essential oils and uva ursi. The essential oils apparently owe their diuretic action to a renal irritation which possibly results in renal congestion and opening up of glomeruli. In larger doses, they cause strangury and renal retention. Thyroid extract also has some diuretic effect, as do small doses of pituitary extract. Larger doses of pituitary extract have a definite anuretic action.

The chief value of diuretics is in cases of disturbed water balance, that is, where there is retention of superfluous fluid in the tissues or serous cavities. Under such conditions, also, the clinical effect of the drug therapy is more readily demonstrable.

## HEMORRHAGIC BRIGHT'S DISEASE

In hemorrhagic Bright's disease, we are dealing with an inflammation of the renal tissue in either an acute, subacute, or chronic form. Since we have no drug therapy which influences favorably the inflammatory process, it must be a principle of treatment that no harm or further renal irritation be caused by the medication. In the acute or initial phase of hemorrhagic Bright's disease, it would seem dis-

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tinctly logical that no effort be made to stimulate renal function, inasmuch as it is apparent that the renal tissue is making use of its maximum capacity. The purine derivatives have been much used under such circumstances but it has not been demonstrated that the water output or urea excretion is notably influenced by this form of therapy. Urinary excretion may improve considerably after a few days of treatment, but this is probably explained on a basis of coincidental renal improvement. Circulatory stimulants, especially digitalis, may be tried for general supportive purposes but it is unlikely that they will result in any increased circulation in the already congested and swollen renal tissue. The use of large amounts of water is generally contraindicated in view of the edema which is apt to be present, although Volhard<sup>2</sup> has been successful at times in giving large amounts of water up to 1500 cc. at one time, in an effort to break down the so-called renal block. Similarly, the saline diuretics, which cannot be excreted readily owing to the pathological condition in the kidney, will simply increase the osmotic pressure of the blood and further reduce the tendency to urinary secretion. The use of urea in large amounts is also contraindicated because of the increased blood urea which is a feature of severe cases of this type. The administration of sugar solutions intravenously, on the other hand, may be extremely useful from the general supportive viewpoint when the gastro-intestinal system is severely disturbed and, because of this fact, some degree of secondary improvement in renal function may occur. The use of mercurials is definitely contraindicated, not only because of the nephrotoxic action of the mercury but chiefly because of the danger of retention of the mercury.

In the latent stage of hemorrhagic Bright's disease, the use of diuretic drugs is usually unnecessary and illogical. In this phase, the renal tissue has regained sufficient function to render the patient asymptomatic. Edema has disappeared and the nitrogenous waste products are at a normal level. Further stimulation of the renal tissue will result in very little effect and may increase the hematuria and albuminuria.

In the active chronic stage, the use of diuretics has a very limited sphere of usefulness. Digitalis should be given if there is any evidence of myocardial insufficiency and it has been shown that the action of this drug is not affected by the presence of renal insufficiency. Where there is marked reduction of renal function, it is not to be expected that an increased renal circulation of any degree can be produced by its use. The purine derivatives are also likely to be disappointing in their effect and, in case of marked renal impairment, their retention with toxic effects may be noted. The mercurials may be used with caution in the chronic active stage. They are of some value in reducing edema but care should be exercised to see that the albuminuria and hematuria are not increased by their use and to be sure that there is no danger of

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mercurialism from their retention because of reduced renal function. The saline diuretics, especially potassium nitrate, may be tried.

### DEGENERATIVE BRIGHT'S DISEASE

The term, degenerative Bright's disease, comprises a heterogeneous group of renal conditions which are characterized by the presence of large amounts of albumin and casts of all types in the urine, but the red blood cells characteristic of the inflammatory group are not found. Clinically, this condition is characterized by the most massive edema seen in renal conditions, and by the absence of the hypertension and acute episodes frequently encountered in the hemorrhagic group. Examination of the blood shows a deficiency of plasma protein, a factor which undoubtedly accounts for the development of the edema since the osmotic pressure due to the colloids is therefore correspondingly reduced. There is also a marked cholesteremia. Pathologically, the disease is characterized by a lesion of the tubular epithelium, the glomeruli remaining relatively normal. This is a type of renal lesion secondary to poisoning with the heavy metals as well as to the toxemia associated with pregnancy and infection. A well recognized subgroup is the cryptic or lipoid nephrosis of unknown etiology, regarded by Epstein<sup>3</sup> as being a general metabolic disturbance of protein metabolism, the renal lesion being secondary. Inasmuch as this group shows the highest degree of edema with a kidney which is apparently not the seat of inflammatory change, diuretics assume a much greater degree of importance in regard to treatment.

Improvement in the general circulation by the use of the circulatory group of diuretics is sometimes of value in this group and this is particularly true where there is an element of cardiac failure; in fact, with primary myocardial insufficiency, the secondary renal lesion which occurs with the development of albumin in the urine is undoubtedly a mild degenerative lesion of this type and very frequently the albumin disappears from the urine following improvement in the cardiac condition. The purine group of diuretics have relatively little value under such circumstances, causing only very slight reduction of the edema. In the presence of massive edema, the use of large quantities of water is, of course, contraindicated, and, similarly, the use of sodium salts is inadvisable on account of the hydropigenic quality of sodium. Potassium salts, especially the nitrate, are useful. The administration of urea in dosage of ten to twenty grams, three times daily, is frequently a very useful measure and will give satisfactory clinical results. Inasmuch as there is no tendency for urea retention in this type of renal lesion, its use is perfectly allowable. The intravenous use of hypertonic solutions of sugar may also be of distinct value and, in addition to the



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diuretic effects which may be obtained, they are frequently of value as a source of available energy to those patients with disturbed function of the gastro-intestinal tract.

The use of the newer mercurials in this condition has been extremely successful. Calomel should not be used but novasurol and salyrgan, preferably the latter, have been extremely valuable. It is true that these preparations contain mercury and that mercury selectively poisons the tubular epithelium; however, if they are used cautiously, there seems to be no danger in their administration. They should not be used if there is a marked reduction of renal function or in the presence of severe anemia, cachexia, fever, or diarrhea. They may be given either intravenously or intramuscularly, although the intramuscular injection of novasurol is often fairly painful. It is well to begin with a test dose of one-half cc. which, if it produces no ill effects, may be increased within the next day or two to one to two cc., following which it may be given at intervals of two or three days until four or five doses have been given. Its action is undoubtedly considerably aided by the administration by mouth of sixty to ninety grains daily of ammonium chloride or nitrate, preferably the latter, for a day or two previously and continuously throughout the course of treatment.

In degenerative lesions of the kidney, the use of thyroid extract frequently produces striking diuretic results. Such patients usually have a lowered basal metabolic rate but, even with slight reduction of the metabolic rate, such patients will tolerate large doses of thyroid extract without experiencing any toxic effects. It has been demonstrated that toxic effects are not seen in the presence of the hypercholesteremia of this lesion and that the level of cholesterol in the blood may be used as a guide to thyroid therapy. Dosage should be started with one-half to one grain daily and gradually increased up to two or three grains daily if well tolerated and its use may be continued over long periods of time. Its mode of action is uncertain. It has been suggested that the resorption of salt solution from the subcutaneous tissues is slower in the animal with hyperthyroidism and that this is accelerated by the administration of thyroid extract. Epstein<sup>3</sup> believes that the beneficial effect is due to a stimulation of protein metabolism, an abnormality of which he regards as the fundamental basis of the disease and he uses the glandular products as an adjuvant to his high protein intake. In a few cases, particularly those associated with a disturbance of calcium metabolism and clinical manifestations of tetany, the use of parathyroid extract has given a good diuretic response.

## RENAL LESIONS OF VASCULAR ORIGIN

In the renal lesion of vascular origin, edema is far more frequently of cardiac than of renal origin and, consequently, the general circulatory

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group of diuretics is of most value, chiefly because of their cardiac action. In the earliest stages of essential hypertension, evidences of renal disease are entirely lacking but, as the condition progresses, small amounts of albumin, a few casts, and periodically some red blood cells may be found in the urine. At no time do the renal signs approach those seen in the hemorrhagic or degenerative group, and in only a small proportion of these cases does death result from renal insufficiency. The rationale for the widespread use of diuretics in this group of cases has apparently been based largely upon the conception that the etiology depended upon renal causes but there is no good evidence that the hypertension can in any way be affected by the use of any diuretic drug.

Digitalis is, of course, indicated in myocardial insufficiency and has been recommended by many to be of value in supporting the heart which has not shown signs of weakening. In the presence of failure and edema, it is of great value and, of course, secondarily improves the renal circulation. The purine derivatives have been widely used in this condition but their value would seem to be confined largely to extrarenal effects such as coronary dilatation. In this respect, theophylline would appear to be the most valuable drug. Saline diuretics similarly are of little value. The intravenous administration of sugar solutions, because of their nutritive and perhaps to a less extent of their diuretic effect, are very useful but it is important to remember that the circulation must not be loaded with too much fluid. Edema occurs rather rarely in the absence of congestive failure but, if present, the use of salyrgan, either alone or combined with ammonium nitrate, is of distinct value.

In general, it would appear that the use of substances designed to stimulate intrarenal activity has decreased markedly and that the emphasis in the study of diuretics now lies upon substances designed to assist the extrarenal processes incidental to the formation of urine.

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# **The Frank E. Bunts Institute**

The Frank E. Bunts Institute announces a course in "Diseases of the Endocrine Glands" which will be given on Monday, Tuesday, and Wednesday, April 18, 19, and 20, 1938.

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The following program will be presented:

## **DISEASES OF THE ENDOCRINE GLANDS**

### **Monday, April 18, 1938**

8:30 A. M.— 9:00 A. M. Registration

9:00 A. M. Introduction ..... GEORGE CRILE, SR., M. D.

9:00 A. M.—10:30 A. M. Differential Diagnosis of Diseases of  
the Thyroid Gland ..... E. P. McCULLAGH, M. D.

10:30 A. M.—11:30 A. M. An Analysis of the End Results of  
25,740 Operations on the Thyroid  
Gland ..... GEORGE CRILE, SR., M. D.

11:30 A. M.—12:15 P. M. Malignancy of the Thyroid Gland ..... ALLEN GRAHAM, M. D.

12:30 P. M.— 1:30 P. M. Luncheon

1:30 P. M.— 2:00 P. M. Exhibits

The Biochemistry of Hyperthyroid-  
ism—Practical Value of Tests ..... D. ROY McCULLAGH,  
PH. D.

2:00 P. M.— 3:00 P. M. The Cardiovascular Complications of  
Thyroid Disease ..... A. C. ERNSTENE, M. D.

3:00 P. M.— 4:00 P. M. Surgical Indications in Disease of the  
Thyroid Gland ..... R. S. DINSMORE, M. D.

4:00 P. M.— 5:00 P. M. The Psychoses Associated with Thy-  
roid Disease ..... LOUIS J. KARNOSH, M. D.

6:30 P. M. Dinner

8:15 P. M. The Evolution of the Glandular Sys-  
tem—Its Meaning in the Etiology  
and Treatment of Certain Diseases. GEORGE CRILE, SR., M. D.

## Tuesday, April 19, 1938

- 9:00 A. M.— 9:45 A. M. Management of Severe Hyperthyroidism and the Bad Risk Patient ..... GEORGE CRILE, JR., M. D.
- 9:45 A. M.—10:30 A. M. The Ocular Complications of Thyroid Disease ..... A. D. RUEDEMANN, M. D.
- 10:30 A. M.—11:30 A. M. Management of Functional Menstrual Disorders ..... E. P. McCULLAGH, M. D.
- 11:30 A. M.—12:15 P. M. Hypothyroidism—Signs, Symptoms, and Treatment ..... C. L. HARTSOCK, M. D.
- 12:30 P. M.— 1:30 P. M. Luncheon
- 1:30 P. M.— 3:00 P. M. The Management of Diabetes ..... E. P. McCULLAGH, M. D.
- 3:00 P. M.— 3:45 P. M. Influence of the Endocrine Glands on Benign Hypertrophy of the Prostate and Impotency and Sterility in the Male ..... W. E. LOWER, M. D.
- 3:45 P. M.— 4:15 P. M. Sterility in Women ..... T. E. JONES, M. D.
- 4:15 P. M.— 5:15 P. M. The Roentgen Aspects of Endocrine Diagnosis ..... B. H. NICHOLS, M. D.
- 6:30 P. M. Dinner
- 8:15 P. M. Frank E. Bunts Lecture

## Wednesday, April 20, 1938

- 9:00 A. M.— 9:45 A. M. Management of Undescended Testicles ..... CHARLES C. HIGGINS, M. D.
- 9:45 A. M.—10:30 A. M. The Diagnosis and Treatment of Prostatic Disease ..... W. J. ENGEL, M. D.
- 10:30 A. M.—11:30 A. M. Lesions of the Pituitary Gland—Diagnosis and Treatment ..... W. JAMES GARDNER, M. D.
- 11:30 A. M.—12:00 Noon Obesity ..... E. P. McCULLAGH, M. D.
- 12:30 P. M.— 1:30 P. M. Luncheon
- 1:30 P. M.— 2:00 P. M. Exhibits  
Demonstration of the Value of Assays (laboratory) in Endocrine Diagnosis ..... W. KENNETH CUYLER, M. A.

**Wednesday, April 20, 1938 (Continued)**

**SYMPOSIUM ON LESIONS OF THE BREAST**

- 2:00 P. M.— 2:45 P. M. Clinical Significance of a Lump in the  
Breast \_\_\_\_\_ GEORGE CRILE, JR., M. D.
- 2:45 P. M.— 3:30 P. M. Points in Surgery of the Breast with  
Clinical End Results \_\_\_\_\_ R. S. DINSMORE, M. D.
- 3:30 P. M.— 4:15 P. M. The Pathological Changes of Lesions  
of the Breast \_\_\_\_\_ ALLEN GRAHAM, M. D.
- 4:15 P. M.— 5:00 P. M. Roentgen Therapy in Cancer of the  
Breast \_\_\_\_\_ U. V. PORTMANN, M. D.
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**REGISTRATION BLANK**

\_\_\_\_\_, 1938

THE FRANK E. BUNTS INSTITUTE  
Cleveland Clinic  
Cleveland, Ohio

*Gentlemen:*

Please register me for the course in "Diseases of the Endocrine Glands" which is to be given April 18, 19, and 20, 1938.

I am enclosing a check for \$5.00 and the remainder of the fee, \$5.00, will be paid on registration, April 18th.

Note: Checks should be made payable to The Frank E. Bunts Institute and sent to A. D. Ruedemann, M. D., Cleveland Clinic, Cleveland, Ohio.

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_  
Medical School from Which Graduated

## Exhibits

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Sellar and Parasellar Tumors .....DR. W. JAMES GARDNER

Transurethral Resection of the Prostate .....DR. W. J. ENGEL

Medical Treatment of Prostatic

Hypertrophy .....DR. WILLIAM E. LOWER

Roentgen Changes in Endocrine Diseases .....DR. B. H. NICHOLS AND  
DR. JOSEPH C. ROOT

Cardiovascular Complications of

Hyperthyroidism .....DR. A. C. ERNSTENE

Evolution of Thyroid Disease .....DR. GEORGE CRILE AND  
DR. GEORGE CRILE, JR.

Technic of Thyroid Surgery .....DR. GEORGE CRILE, JR.

Carcinoma of the Breast .....DR. ALLEN GRAHAM AND  
DR. GEORGE CRILE, JR.

Diabetes .....DR. E. P. McCULLAGH

Obesity .....DR. E. P. McCULLAGH

Clinical Results of Testes Hormone Assays .....DR. E. P. McCULLAGH



